4 SEPA Analysis Project Alternatives

This section includes a description of each of nine EIS alternatives and their associated environmental impacts, benefits and/or mitigation. The alternatives include a SEPA No Action alternative, as well as eight alternatives evaluated in the FS Report. The numbering of the Alternatives has been maintained consistent between the RI/FS and this Supplemental EIS to facilitate comparison between the two documents.

Table 4-1 provides a concise description of each of the Alternatives including alternative costs, remedial technologies used, and land use implications for the Whatcom Waterway and ASB.

Table 4-1 Concise Summary of Evaluated Alternatives

Alternative Description									
		Cleanup Technologies Applied						Land Use	
Cleanup Alt.	**Probable Cost [1] ($ Million)**	**Institutional Controls**	**Monitored Natural Recovery**	**Containment**	**Removal & Disposal**	**Treatment**	**Reuse & Recycling**	**Whatcom Waterway**	**ASB**
No Action (Fig 4-1)	**$ 0**	**Yes**	**Yes**	**Yes**	--	--	--	Limited-Use Channel	Non-Aquatic (Not Capped)
Alt. 1 (Fig 4-2)	**$ 8**	**Yes**	**Yes**	**Yes**	--	--	--	Limited-Use Channel	Non-Aquatic (Capped)
Alt. 2 (Fig 4-3)	**$ 34**	**Yes**	**Yes**	**Yes**	--	--	--	Dredged for 1960s Industrial Channel	Non-Aquatic (Capped)
Alt. 3 (Fig 4-4)	**$ 34**	**Yes**	**Yes**	**Yes**	--	--	--	Dredged for 1960s Industrial Channel	Non-Aquatic (Filled)
Alt. 4 (Fig 4-5)	**$ 22**	**Yes**	**Yes**	**Yes**	**Yes**	--	--	Dredged for Multi-Purpose Channel	Non-Aquatic (Capped)
Alt. 5 (Fig 4-6)	**$ 42**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Dredged for Multi-Purpose Channel	Aquatic (Opened to Bay)
Alt. 6 (Fig 4-7)	**$ 44**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Dredged for Multi-Purpose Channel	Aquatic (Opened to Bay)
Alt. 7 (Fig 4-8)	**$ 74**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Dredged for 1960s Industrial Channel	Aquatic (Opened to Bay)
Alt. 8 (Fig 4-9)	**$ 146**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Dredged for 1960s Industrial Channel	Aquatic (Opened to Bay)

Note 1. Costs shown in Table 4-1 exclude costs associated with mitigation of SEPA adverse environmental impacts.

Table 4-2 provides a more comprehensive side-by-side description of each of the alternatives, with detailed descriptions of actions to be conducted in each area of the site. Table 4-2 also summarizes the impacts, benefits and mitigation associated with each alternative. Figures 4-1 through 4-9 illustrate the design concept of each of the alternatives.

The following sections describe each of the nine EIS alternatives and their environmental impacts, benefits and mitigation. Refer to Section 3 for additional background information on the elements of the environment discussed in this Section.

4.1 Project No Action Alternative

Figure 4-1 illustrates the design concept for the No Action project alternative. This alternative does not comply with MTCA cleanup requirements.

4.1.1 Alternative Description

As its name suggests, the No Action alternatives does not include active remediation, monitoring or other actions in any site areas. Some sediment recovery through natural processes of sedimentation will occur in portions of the site, but these actions will not be monitored, and no contingencies will be in place should recovery fail to achieve site cleanup levels.

Actions by Site Area

Actions performed under the No Action Alternative are described below by site area.

- **Outer Whatcom Waterway (Unit 1):** Under the No Action Alternative, no dredging or capping will be performed in the outer portion of Whatcom Waterway. Surface sediments in this area currently comply with SMS criteria. Subsurface impacted sediments would remain in place beneath the clean surface sediments. Some reduction in waterway depth would result under this alternative. No monitoring, institutional controls or other measures are included to ensure that subsurface contaminated sediments are not disturbed.

- **Inner Whatcom Waterway (Units 2 & 3):** As with the Outer Whatcom Waterway, no dredging, capping, monitoring or institutional controls would be performed in the Inner Whatcom Waterway. The majority of this area has naturally recovered, with some surface contamination remaining in nearshore berth areas along the Colony Wharf portion of the Central Waterfront site, and in an area near the Log Pond. Future use of the Inner Whatcom Waterway would be encumbered by areas of shoaling at the head of the waterway and in berth areas. No shoreline stabilization is conducted under this alternative.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. However, some erosion in

shoreline areas has been noted during 5-year monitoring. No further actions would be taken in this area under the No Action Alternative.

- **Areas of ASB (Unit 5):** Exceedances of site-specific cleanup levels within Unit 5-B have been noted. However, no capping, dredging, institutional controls or monitoring will be performed in this area.

- **Areas Near Bellingham Shipping Terminal (Unit 6):** Exceedances of site-specific cleanup levels within Units 6-B and 6-C have been noted. However, no capping, dredging, institutional controls or monitoring will be performed in these areas.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No capping, dredging, institutional controls or monitoring will be performed in this area.

- **ASB (Unit 8):** The ASB will not be remediated under this Alternative. The presence of the impacted sludges will prevent future aquatic reuse of the ASB.

Sediment Disposal

No sediment dredging is included in the No Action Alternative. No sediment disposal sites are required under this alternative.

Costs & Schedule

The No Action Alternative has no project costs or actions associated with its implementation. However, costs may be substantial to conduct mitigation of impacts associated with the No Action Alternative.

4.1.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with the No Action alternative.

Geology, Water and Environmental Health

The No Action alternative produces net adverse impacts with respect to geology, water and environmental health. Significant impacts and potential mitigation requirements include the following:

- **Adverse Impact – Cleanup Not Performed:** The No Action alternative does not comply with MTCA or SMS regulations. Environmental health is not protected under this alternative. Potential impacts to human health and/or environmental receptors are not controlled. Mitigation of these impacts will require additional remedial measures as provided in the other project alternatives.

- **No Change – No Construction Disturbances to Water Quality:** The No Action alternative does not involve construction activities. Therefore there will be no construction impacts to existing water quality. This avoids adverse impacts associated with construction activities.

- **Adverse Impacts – Sediment Resuspension:** The No Action alternative does not conduct remediation or apply institutional controls in navigation areas. The potential for resuspension of impacted subsurface sediments is not controlled. Mitigation of this potential impact would require the implementation of additional remediation.

- **Adverse Impact – Interference with Shoreline Stabilization:** The shorelines in the Inner Whatcom Waterway include areas where shoreline infrastructure has degraded to the point that the shorelines are unstable. Because no actions are conducted to stabilize and remediate these shoreline areas, shoreline erosion will likely occur, resulting in impacts to upland property. The presence of the contamination will hinder future shoreline stabilization projects. Impacts associated with shoreline erosion and/or recontamination may also occur in the Log Pond, since the No Action alternative does not include the shoreline enhancements provided under the other project alternatives.

Fish and Wildlife

The No Action alternative results in net adverse impacts to fish and wildlife category. Significant impacts and potential mitigation requirements include the following:

- **Adverse Impact – Lack of Environmental Protectiveness:** The No Action alternative does not protect fish or wildlife from potential contamination impacts. These potential impacts offset other potential benefits associated with the No Action alternative. The mitigation of this issue will require implementation of additional cleanup measures as provided under the other project alternatives.

- **No Change – No Construction Disturbances:** Because the No Action alternative does not involve construction activities, this alternative does not trigger short-term disruptions associated with dredging and capping activities.

- **Beneficial Impact – Preservation of Nearshore Habitats:** The No Action alternative does not change bottom contours in the Waterway or harbor areas. Where emergent nearshore aquatic habitats have developed, these areas would remain undisturbed

under this Alternative. However, the No Action Alternative does not ensure that this preservation will be maintained over the long-term.

Land Use, Navigation and Public Shoreline Access

The No Action alternative conflicts with community land use, navigation and public shoreline access plans. The alternative results in significant net adverse impacts under these environmental categories. Mitigation of these impacts requires additional actions, as are conducted under other project alternatives:

- **Adverse Impacts – Outer Whatcom Waterway Navigation:** The No Action Alternative does not remove impacted sediments in the Outer Whatcom Waterway. The presence of residual impacted sediments will impact the effective water depth of the terminal area. Current water depths range from about 30 feet to over 35 feet below MLLW, but dredging will be required in the future to maintain navigation depth. Such dredging would resuspend impacted sediments unless the dredging were precluded below the current mudline. This would effectively limit the usable and maintainable water depth in this area to a minimum of approximately 25 to 26 feet below MLLW. The restoration of deep draft use capabilities at the Bellingham Shipping Terminal consistent with the current infrastructure and channel dimensions would require implementation of sediment removal as provided under other project alternatives (Alternatives 2 through 8).

- **Adverse Impacts – Inner Whatcom Waterway Navigation**: The Inner Whatcom Waterway has highly variable mud-line elevations. Shoaling is present particularly at the head of the waterway (near the Roeder Avenue bridge) and along the berth areas of the Central Waterfront shoreline. Effective water depths (the usable water depth along the current pierhead line) in this area vary from about -7 feet MLLW to areas that are exposed at low tide. Under the No Action Alternative, navigation in many of these areas would be impaired or effectively precluded, because insufficient depth would remain to allow for vessel traffic or for future waterway maintenance and navigation. Because waterway sediments would not be managed actively through capping and/or removal as under other project alternatives, project construction planning and permitting for any future shoreline activities along the Waterway would have greater recontamination risks, and this would tend to limit redevelopment flexibility of these nearshore areas. Mitigation of these impacts would require implementation of additional active remediation as provided under other project alternatives.

- **Beneficial Impacts – Habitat Preservation and Enhancement:** The No Action Alternative would result in preservation of

emergent nearshore habitat at the head and along the sides of the Inner Whatcom Waterway. As noted above, the No Action Alternative does not provide long-term protectiveness for these habitat areas. Preserving and enhancing nearshore habitat along salmon migration corridors is consistent with the Bellingham Bay Comprehensive Strategy and will benefit juvenile salmonids and other fish and wildlife species.

- **Adverse Impact – Conflict with Planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina with integrated public access and habitat enhancements. The No Action Alternative does not remediate the ASB and directly conflicts with this planned reuse. Mitigation of this impact would require remediation of the ASB as provided under other project alternatives (Alternatives 5, 6, 7 or 8).

Air and Noise

The No Action alternative does not involve new construction activities. No changes to existing air quality or noise levels are anticipated under this alternative.

Cultural Resources

The No Action alternative does not involve construction-associated impacts to historical or cultural resources.

4.2 Project Alternative 1

Alternative 1 uses containment, monitored natural recovery and institutional controls to comply with SMS cleanup levels and MTCA cleanup requirements. Alternative 1 makes the least use of active remedial technologies of all of the alternatives evaluated in the FS Report.

4.2.1 Alternative Description

Alternative 1 is illustrated in Figure 4-1. The application of active cleanup measures and institutional controls is detailed in Table 4-2 for each Site Unit:

Actions by Site Area

Actions performed under Alternative 1 are described below by site area.

- **Outer Whatcom Waterway (Unit 1):** Under Alternative 1, no dredging or capping will be performed in the outer portion of Whatcom Waterway. Surface sediments in this area currently comply with SMS criteria. Subsurface impacted sediments would remain in place beneath the clean surface sediments. Some reduction in waterway depth would result under this alternative.

Future channel maintenance would likely be restricted beneath elevations of approximately 26 feet below MLLW in order to avoid resuspension of impacted subsurface sediments. This depth restriction would need to be addressed in Waterway planning and site institutional controls.

- **Inner Whatcom Waterway (Units 2 & 3):** As with the Outer Whatcom Waterway, no dredging or capping would be performed in the Inner Whatcom Waterway under Alternative 1. The majority of this area has naturally recovered, with some surface contamination remaining in nearshore berth areas along the Colony Wharf portion of the Central Waterfront site. Additional recovery time will be required to achieve full restoration of this area. Reductions in waterway depths will accompany the use of natural recovery in the Inner Whatcom Waterway areas. Additional recovery modeling would be required as part of Cleanup Action Plan development and/or remedial design to verify the applicability of natural recovery for this area. Institutional controls and monitoring are included for the Inner Whatcom Waterway area.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. Actions in this area will include enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap. These enhancements are described in Appendix D of the FS Report.

- **Areas Offshore of ASB (Unit 5):** Exceedances of site-specific cleanup levels within Unit 5-B will be remediated using sub-aqueous capping. Appendix C of the FS Report describes the design concept for this area, including methods to maintain cap stability in a manner compatible with anticipated permitting requirements. The remaining areas of Unit 5 comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas at this time. Additional evaluations of sediment stability will be conducted as part of engineering design. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels. Additional measures will be taken in this area only if engineering design evaluations indicate that such measures are required.

- **Areas Near BST (Unit 6):** The area south of the barge docks at the Bellingham Shipping (Units 6-B and 6-C) exceeds SMS cleanup levels. This area will be remediated using a deep-water sub-aqueous cap. Final water depths in this area will be greater than -

18 feet MLLW in most areas, consistent with shoreline infrastructure and navigation uses historically conducted there. The cap will be constructed of coarse granular materials and will be designed to resist potential prop-wash erosion effects. The remaining portions of Unit 6 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **ASB (Unit 8):** The sludges within the ASB will be remediated using a thick sub-aqueous cap. Prior to cap placement, the treatment equipment (aerators, weirs, etc.) would be removed from the ASB. The conceptual design for the cap includes a nominal 3-foot layer of sandy capping material, with coarse materials placed in nearshore areas where wind-driven wave action may be significant.

Sediment Disposal

No sediment dredging is included in Alternative 1. All impacted sediments are managed in-place using containment technologies (capping) and monitored natural recovery. No sediment disposal sites are required under this alternative.

Costs & Schedule

Alternative 1 is the lowest cost of the eight alternatives evaluated in the FS Report. The total probable cost of Alternative 1 is $8 million. Most of this cost is associated with the capping of the ASB sludges and the two impacted harbor areas. Additional costs are included to provide for long-term monitoring of capping and natural recovery areas. Mitigation costs are not included in the $8 million probable cost estimate.

The construction activities in Alternative 1 can likely be completed within a single construction phase. The capping activities in the two impacted harbor areas would be completed during appropriate times of the year when the potential for impacts to juvenile salmonids is minimized. These construction "fish windows" (the time periods during which in-water construction can be performed while minimizing potential impacts to juvenile salmonids) are typically specified as part of project permitting requirements. Because the ASB area is not connected to Bellingham Bay, the capping activities within the ASB will not necessarily be time-limited by the "fish windows".

Monitoring of capped and natural recovery areas will occur under Alternative 1. Previous recovery analyses performed as part of the Remedial Investigation suggest that 5 and 10 years may be required for the sediment areas near the Colony Wharf portion of the Central Waterfront site. Site-specific recovery modeling would be required as part of Cleanup Action Plan development or remedial design to verify the effectiveness of this alternative.

4.2.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 1.

Geology, Water and Environmental Health

Alternative 1 produces net adverse impacts under the category including geology, water and environmental health. Significant impacts and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 1 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C) and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impact – Construction Water Quality:** Alternative 1 includes capping activities in Units 5B, 6B and 6C. This capping will result in short-term disturbances to water quality during placement of capping material. These impacts can be mitigated through the use of best practices for design and construction of the caps. For capping of the ASB, the cap material would be placed without opening the facility to surface water. For the other two capping areas, water quality control will be achieved through use of appropriate equipment and cap materials, and the controlled placement of cap material. The use of highly dispersive placement methods (e.g., hydraulic placement) for capping of the Unit 5 and Unit 6 areas should be avoided. The project will include additional state and federal agency review as part of project design and permitting.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 1 remediates the Whatcom Waterway navigation areas using monitored natural recovery and institutional controls. While these actions may impact land uses (see below), these actions would reduce the potential for sediment resuspension relative to the No Action Alternative.

- **Adverse Impact – Interference with Shoreline Stabilization:** Portions of the shoreline infrastructure in the Inner Whatcom Waterway have degraded, resulting in shoreline instability. Because no actions are conducted to stabilize and remediate these shoreline areas, shoreline erosion may occur, resulting in impacts to upland property. The presence of contaminated sediment in berth areas will tend to interfere with public or private shoreline stabilization efforts. Mitigation of these impacts would require either development of stable shoreline slopes as under project Alternatives 4, 5 and 6, or the installation of new hardened shoreline infrastructure as in project Alternatives 2, 3, 7 or 8.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 1, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

Fish and Wildlife

Alternative 1 results in net beneficial impacts to fish and wildlife. Significant impacts, benefits and mitigation associated with Alternative 1 include the following:

- **Beneficial Impact – Environmental Cleanup:** Completion of site cleanup and compliance with site cleanup levels will protect aquatic receptors from the effects of contaminated sediments.

- **Mitigated Impact – Construction Disturbances:** Construction of Alternative 1 will involve some in-water construction activities associated with capping in Unit 5B and in Units 6B and 6C. Potential disturbances to fish and wildlife could be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities within appropriate “fish windows” to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the impacts associated with construction disturbances under Alternative 1.

- **Beneficial Impacts – Preservation of Inner Whatcom Waterway Habitat:** Alternative 1 does not change bottom contours in the Inner Whatcom Waterway. However, where emergent nearshore aquatic habitats have developed, these areas

would remain undisturbed, and disturbance of these areas would be restricted as part of the site institutional controls. The protection of these emergent habitat areas represents a beneficial impact for fish and wildlife.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 1 will involve some in-water construction activities within the Log Pond to enhance the stability of the Log Pond shoreline. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. Potential adverse impacts associated with substrate changes in some areas are offset by other nearshore habitat gains under the alternative.

- **Beneficial Impacts – Enhancement of Unit 5-B Habitat:** Alternative 1 develops additional nearshore aquatic habitat within Unit 5B, through the construction of an engineered cap. If constructed consistent with the design concept included in Appendix C of the FS Report, the cap will enhance the quality of between 4 and 6 acres of nearshore habitat, with improvements in elevation and reductions in wave energy. The enhancement of nearshore habitat quality in this area as accomplished under that design is consistent with restoration objectives of the Bellingham Bay Comprehensive Strategy and will benefit juvenile salmonids and other fish and wildlife species.

Land Use, Navigation and Public Shoreline Access

Alternative 1 provides a slight enhancement of land use, navigation and public shoreline access uses relative to the No Action alternative. However, net adverse impacts continue to exist under this alternative that can only be mitigated through the implementation of additional actions.

- **Adverse Impact – Outer Whatcom Waterway Navigation:** Alternative 1 does not remove impacted sediments in the Outer Whatcom Waterway. The presence of residual impacted sediments represents a conflict with current and planned navigation uses in this area. Current depths range from about 30 feet to over 35 feet below MLLW, but dredging will be required in the future to maintain navigation depth. Such dredging would resuspend impacted sediments unless the dredging were precluded below the current mudline. This would effectively limit the usable and maintainable water depth in this area to a minimum of approximately 25 to 26 feet below MLLW, which is less than anticipated navigation requirements. This impact to navigation uses is integral to the alternative. The restoration of deep draft use

capabilities at the Bellingham Shipping Terminal consistent with the current infrastructure and land use plans would require implementation of sediment removal as provided under other project alternatives (Alternatives 2 through 8).

- **Adverse Impacts – Inner Whatcom Waterway Navigation**: The Inner Whatcom Waterway area has highly variable mud-line elevations. Shoaling is present particularly at the head of the waterway (near the Roeder Avenue bridge) and along the berth areas of the Central Waterfront shoreline. Effective water depths (the usable water depth along the current pierhead line) in this area vary from about -7 feet MLLW to areas that are exposed at low tide. Under Alternative 1, navigation in many of these areas would be impaired or effectively precluded, because insufficient depth would remain to allow for vessel traffic or for future waterway maintenance and navigation. Because waterway sediments would not be managed actively through capping and/or removal as under other project alternatives, project construction planning and permitting for any future shoreline activities along the Waterway would have greater recontamination risks, and this would tend to limit redevelopment flexibility of these nearshore areas. Mitigation of these impacts would require implementation of additional active remediation as provided under other project alternatives.

- **Adverse Impact – Conflict with Planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina with integrated public access and habitat enhancements. Alternative 1 remediates the ASB by capping, which directly conflicts with this planned reuse. Mitigation of this impact would require remediation of the ASB as provided under other project alternatives (Alternatives 5, 6, 7 or 8).

Air and Noise

Alternative 1 involves new construction activities associated with the placement of environmental caps in Unit 8, Unit 5B and Units 6B and 6C. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions), or 4) the direct supply of cap material by barges to the capping site without stockpiling. These mitigation measures can be incorporated during project design and permitting.

Cultural Resources

Alternative 1 does not involve any dredging activities or other construction activities that are likely to disrupt existing historical or archaeological resources. Additional review of these issues would be conducted as part of project permitting (e.g., through Section 106 consultations as part of Army Corps of Engineers permitting).

4.3 Project Alternative 2

Alternative 2 uses monitored natural recovery, institutional controls and containment technologies to comply with SMS cleanup levels and MTCA cleanup requirements. The design concept for alternative 2 is shown in Figure 4-3.

4.3.1 Alternative Description

Unlike Alternative 1, dredging of sediments from within the Whatcom Waterway channel is conducted. These sediments are managed in a new Confined Aquatic Disposal (CAD) facility that would be developed offshore of the Cornwall Avenue Landfill. The Cornwall CAD site location was selected during the 2000 EIS after evaluation of potential alternative locations.

Alternative 2 represents a modification of the preferred alternative from the 2000 RI/FS and EIS process. These analyses were based on continued industrial uses of the Central Waterfront and New Whatcom areas. These analyses also assumed that future land uses would comply with the restrictions applicable to continued maintenance of the 1960s industrial navigation channel in the Whatcom Waterway. Current zoning and land use planning have significantly changed since the 2000 evaluation.

Actions by Site Unit

Actions conducted as part of Alternative 2 are described below by site area. Specific actions are listed by Site Unit in Table 4-2.

- **Outer Whatcom Waterway (Unit 1):** Under Alternative 2, the outer portion of the waterway would be dredged to a minimum depth of

35 feet below MLLW. Where technically feasible, the dredging depths would be increased to allow dredging to the base of the impacted sediments in the channel areas. Anticipated dredge depths vary from 35 feet below MLLW to about 41 feet below MLLW. The sediments removed during this dredging would be barged to the Cornwall CAD site location, and placed within the containment facility. The sediments from Units 1A and 1B would be used in upper portions of the CAD site, and the facility would be completed as described below. Some capping may be required in areas that are not technically feasible to dredge (to be determined during remedial design and permitting). Dredging methods used for the Outer Whatcom Waterway would likely be mechanical, reducing the entrained water management concerns applicable to hydraulic dredging, and producing dredge materials with physical properties appropriate for CAD site management. Detailed dredging and construction procedures and alternatives would be evaluated in project design and permitting.

- **Inner Whatcom Waterway (Units 2 & 3):** Under Alternative 2, sediment dredging would be performed as necessary to provide for future use and maintenance of the 1960s industrial navigation channel to the head of the waterway. The 1960s federal channel boundaries specify a water depth of 30 feet below MLLW from the Port terminal area to Maple Street. A depth of 18 feet is specified from Maple Street to the head of the waterway. In the Outer Whatcom Waterway, the dredging cut would be established at an elevation at least 35 feet below MLLW. This would remove sediments where technically feasible, and would provide sufficient overdepth to allow residual sediments to be capped without impeding future maintenance of the federal channel. The design concept assumes a cap thickness of 3 feet over dredged areas with residual subsurface sediment impacts. Due to historical encroachment of shoreline fills on the federal channel boundaries, many of the Inner Whatcom Waterway shoreline areas have fill and bulkheads located near or at the pierhead line. Most of these bulkheads would require replacement and/or substantial upgrades in order to maintain shoreline stability in these areas during and after dredging. Most docks and bulkheads along the Central Waterfront shoreline were constructed historically when the channel depth was shallower (18 feet below MLLW) and these docks and bulkheads would need to be either removed or replaced in order to accommodate channel dredging and future use.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions

completed as part of that project. Actions in this area will be limited to enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap edges. These enhancements are described in Appendix D of the FS Report.

- **Areas Offshore of ASB (Unit 5):** Exceedances of site-specific cleanup goals within Unit 5-B will be remediated using sub-aqueous capping. Appendix C of the FS Report describes the design concept for this area, including methods to maintain cap stability in a manner compatible with anticipated permitting requirements. The remaining areas of Unit 5 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas at this time. Additional evaluations of sediment stability will be conducted as part of engineering design. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels. Additional measures will be taken in this area only if engineering design evaluations indicate that such measures are required.

- **Areas Adjacent to BST (Unit 6):** The area south of the barge docks at the Bellingham Shipping Terminal (Units 6-B and 6-C) exceeds SMS cleanup levels. This area will be remediated using a deep-water sub-aqueous cap. Final water depths in this area will be greater than -18 feet MLLW in most areas, consistent with shoreline infrastructure and navigation uses historically conducted there. The cap will be constructed of coarse granular materials and will be designed to resist potential prop-wash erosion effects. The remaining portions of Unit 6 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **ASB (Unit 8):** The ASB will will be remediated using a thick sub-aqueous cap. Prior to cap placement, the treatment equipment (aerators, weirs, etc.) would be removed from the ASB. The conceptual design for the cap includes a nominal 3-foot layer of sandy capping material, with coarse materials placed in nearshore areas where wind-driven wave action may be significant. If the ASB is to be used for future stormwater/cooling water treatment, then the ASB would need to either remain connected to the current GP-owned outfall, or be provided with an alternate, appropriate-

sized discharge outfall. Other modifications may be required depending on planned future uses.

Sediment Disposal

Unlike Alternative 1, Alternative 2 involves substantial sediment dredging. The sediments dredged from the Waterway areas will be managed by containment in a new Confined Aquatic Disposal (CAD) area adjacent to the Cornwall Avenue landfill. The design concept estimates disposal of approximately 472,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas, and an additional 113,000 cubic yards of sediments dredged from Units 1A and 1B.

The Cornwall CAD site location was identified through the Bellingham Bay Pilot process, after evaluation of balancing criteria including costs, navigation, land use and habitat factors. The CAD location was incorporated into the range of remedial alternatives discussed in the 2000 RI/FS. The principal benefit of the Cornwall location as identified under the Pilot was the ability to create nearshore aquatic habitat using the CAD design approach. The geography of the area requires initial construction of an armored containment berm, prior to placement of the dredged materials within the site. Armoring of the outer edges of the berm is required to ensure long-term stability of the completed structure under anticipated wave energy and erosion conditions.

During filling of the CAD site, the containment berms would be constructed above tidal elevations. Sediments would be loaded into the facility and allowed to consolidate. The design and permitting for the CAD site would optimize sediment handling and offloading procedures to ensure compliance with water quality criteria near the CAD site location.

After the facility has been filled to design capacity, a capping layer of clean sediments would be placed to provide the final cap surface. The capping sediments will need to be appropriately sized and the cap edges will need to be appropriately constructed to resist wave-induced erosion.

Long-term monitoring and maintenance and institutional controls for the CAD facility would be required as part of the remedy. The construction of the CAD facility would also require coordination with the Cornwall Avenue Landfill and RG Haley cleanup sites, located adjacent to the CAD site location.

Costs & Schedule

The probable costs of Alternative 2 are $34 million. In order of decreasing cost, this estimate addresses dredging and CAD site disposal of Waterway sediments, capping costs for the ASB and harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring. Long-term monitoring costs are higher than under Alternative 1, because of the additional monitoring and periodic maintenance required for the completed CAD

facility. The Alternative 2 costs listed above do not include costs of required mitigation of SEPA environmental impacts.

The construction activities in Alternative 2 can likely be completed within four construction seasons. With the exception of the ASB area, work activities would be confined to appropriate "fish windows." Because the ASB area is not connected to Bellingham Bay, the capping activities within the ASB will not necessarily be time-limited by the "fish windows."

Monitoring of capped and natural recovery areas will occur under Alternative 2. Monitoring will also be performed at the CAD site to ensure long-term effectiveness of the sediment containment.

4.3.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 2.

Geology, Water and Environmental Health

Alternative 2 produces net adverse impacts under the category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 2 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C) and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impacts – Construction Water Quality:** Alternative 2 involves extensive in-water construction activities associated with dredging, capping, and CAD site construction, operation and closure. The project likely will require 4 in-water construction seasons to complete, plus additional time to upgrade shoreline infrastructure. These construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, 3) appropriate design and construction of the CAD site to minimize sediment release during construction, operation and post-closure of the facility, 4) water quality monitoring during construction, and 5) timing of CAD site actions to ensure completion of source control actions at the RG Haley site prior to CAD facility completion.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 2 conducts active remediation by capping in Site Units 5-B, 6-B/C and in the Whatcom Waterway channel. These actions reduce the potential for future resuspension of contaminated sediments in navigation areas.

- **Adverse Impact – Shoreline Destabilization:** Alternative 2 includes deep dredging in the Inner Whatcom Waterway in order to comply with the dimensions of the 1960s industrial channel. This deep dredging will tend to further destabilize existing shorelines in this area. To avoid shoreline stability failures, the shoreline will need to be stabilized with new infrastructure compatible with the deep dredging patterns. Mitigation will be required, including the construction of hardened shoreline treatments including bulkheads and over-water wharves. The potential costs to construct this type of shoreline infrastructure has been estimated at $20 to $40 million for the Inner Whatcom Waterway. These costs are not included in the remediation cost estimates of Alternative 2.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 2, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

Fish and Wildlife

Alternative 2 provides net beneficial impacts to fish and wildlife. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impacts – Construction Disturbances:** Construction of Alternative 2 includes significant construction-related habitat disturbances. These disturbances will occur in several areas, including both dredging and cap areas and the site of the proposed Cornwall CAD site. Potential disturbances to fish and wildlife can be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities during appropriate “fish windows” to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional

environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the short-term habitat impacts associated with construction disturbances under Alternative 2.

- **Mitigated Impact – Inner Whatcom Waterway Nearshore Habitat:** Through dredging of the 1960s industrial channel, Alternative 2 eliminates existing emergent shallow-water habitats at the head and along the sides of the Inner Whatcom Waterway. These impacts would be mitigated by creation of new replacement habitat in alternative site areas (i.e., at the ASB shoulder and/or CAD site locations). Impact avoidance would require the use of alternative channel dimensions inconsistent with Alternative 2 (as in Alternative 4, 5 and 6). In addition to the direct impacts associated with the deep dredging, additional habitat impacts will be incurred during the construction of hardened shoreline infrastructure as necessary to stabilize shorelines and support the use and maintenance of the deep draft waterway uses in the Inner Whatcom Waterway under Alternative 2. Mitigation for these impacts would also occur through construction of new habitat at the ASB shoulder and/or CAD site locations.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 2 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. Potential adverse impacts associated with substrate changes in some areas are offset by other nearshore habitat gains under the alternative.

- **Beneficial Impact -- Development of Nearshore Habitat:** Alternative 2 achieves a net habitat gain through the development of new nearshore habitat on the surface of the Cornwall CAD site. Consistent with the design concept presented in the 2000 FEIS, the elevation of the CAD site surface would be designed to support shallow-water habitat uses. Existing intermediate and deep-water habitats in the CAD site area would be converted to these shallow-water elevations upon completion and closure of the containment facility. New shallow-water habitat would also be created as part of the cap constructed within Unit 5B. The combined habitat benefits of the new CAD facility and the habitat bench in Unit 5B are likely to offset the habitat losses within the Inner Whatcom Waterway. However, the treatment of the Inner Whatcom

Waterway will continue to represent a "gap" in nearshore habitat along the juvenile salmonid migration corridors (see Figure 1-3).

Land Use, Navigation and Public Shoreline Access

Alternative 2 was initially designed to support industrial waterfront uses, consistent with historical land uses. However, waterfront land and navigation uses have changed. Alternative 2 conflicts with these changed uses. These conflicts can only be mitigated through the implementation of alternative channel treatments, as in project alternatives 4, 5 or 6. A summary of significant impacts, benefits and mitigation for Alternative 2 is provided below:

- **Beneficial Impact – Outer Whatcom Waterway Navigation Benefits:** The shoreline infrastructure in the Outer Whatcom Waterway areas is similar to that shown in Figure 3-5 and currently supports deep draft navigation uses. Alternative 2 provides for dredging of deep draft areas of the Outer Whatcom Waterway, consistent with continued deep draft use capabilities. This alignment of dredging patterns with land use and navigation needs represents a benefit of Alternative 2.

- **Adverse Impact – Conflict with Inner Whatcom Waterway Land Uses**: The Inner Whatcom Waterway dredging plan and associated infrastructure requirements under Alternative 2 conflict with planned navigation and land uses. Land use and navigation planning for the Inner Whatcom Waterway area has focused on mixed-use redevelopment, with extensive enhancements to public shoreline access and transient moorage facilities. Significant interest has also been expressed for incorporating habitat restoration into shoreline land uses where such actions are compatible with land use and navigation needs. In contrast to this planned mixed-use redevelopment, Alternative 2 conducts the remediation of the Inner Whatcom Waterway using deep dredging consistent with deep-draft industrial uses. This dredging requires construction of hardened shorelines, bulkheads and industrial shoreline infrastructure to stabilize the deep shorelines and allow maintenance and use of the target dredge depths. These actions result in conflicts with planned land uses for the Inner Whatcom Waterway. These conflicts are intrinsic to Alternative 2, 3, 7 and 8.

- **Beneficial Impacts – Habitat Preservation and Enhancement:** Alternative 2 would enhance habitat quality at the shoulder of the ASB (Unit 5-B). Preserving and enhancing habitat in this area is consistent with the Bellingham Bay Comprehensive Strategy and will benefit juvenile salmonids and other fish and wildlife species.

- **Adverse Impact – Conflict with Planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina with integrated public access and habitat enhancements. Alternative 2 remediates the ASB by capping and directly conflicts with this planned reuse. Mitigation of this impact would require remediation of the ASB as provided under other project alternatives (Alternatives 5, 6, 7 or 8).

Air and Noise

Alternative 2 involves extensive construction activities associated with project dredging, capping and CAD site construction activities. These activities will take place in most areas of the site. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 2 involves extensive dredging activities, including dredging at the head of the Whatcom Waterway in the area near Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. Potential measures to mitigate impacts to these resources would need to be developed during project design and permitting. This would likely be performed as part of the Section 106 consultations as part of Army Corps of Engineers permitting. This consultation would also cover other site areas, though the potential for presence of undisturbed cultural or historical resource in these other areas is much lower.

4.4 Project Alternative 3

Alternative 3 uses a combination of institutional controls, monitored natural recovery and containment to achieve compliance with SMS cleanup levels. Alternative 3 uses dredging to remove sediments from the Whatcom Waterway as necessary to allow use and maintenance of the 1960s federal navigation channel. These sediments are managed by creating a nearshore fill within the majority of the ASB. The portion of the ASB not required for the fill would be retained for stormwater or cooling water treatment uses.

4.4.1 Cleanup Description

The design concept for Alternative 3 is shown in Figure 4-4. A detailed description of the alternative is provided below.

Actions by Site Area

Cleanup Alternative 3 represents a modification of the cleanup Alternative "J" evaluated in a previous Supplemental Feasibility Study (Anchor, 2002) after closure of the Pulp Mill and Chlor-Alkali Plant. The original evaluation of this remedial alternative was based on continued industrial uses of the ASB and upland properties adjacent to the Whatcom Waterway site. These land uses are no longer applicable. A description of Alternative 3 by site unit follows:

- **Outer Whatcom Waterway (Unit 1):** Under Alternative 3, the outer portion of the waterway would be dredged to a minimum depth of 35 feet below MLLW. Where technically feasible, the dredging depths would be increased to allow dredging to the base of the impacted sediments in the channel areas. Anticipated dredge depths vary from 35 feet below MLLW to about 41 feet below MLLW. Under this alternative, dredging from the Outer Whatcom Waterway areas could potentially be conducted using either hydraulic or mechanical dredging. Hydraulic dredging could provide the most cost-effective initial placement of the sediments within the ASB, and may potentially reduce turbidity levels at the point of dredging. However, hydraulic dredging is not well suited for areas containing woody debris, as expected in the Waterway. Further, hydraulic dredging with a cutter-head dredge can leave significant dredging residuals, up to a foot in thickness. Finally, hydraulic dredging would create large quantities of dredge slurry and entrained water. That contaminated water would ultimately be discharged back to Bellingham Bay. Assuming typical operating parameters (i.e., a controlled 2,000 cubic yard per day dredge production rate, a 10:1 water to sediment ratio and either one or two dredge units operating simultaneously) the hydraulic dredging would result in discharge of between 4 million and 8 million gallons per day of produced dredge waters to the Bay. Mechanical dredging and hydraulic dredging would need to be evaluated

during remedial design to optimize project design and ensure protection of water quality during the dredging, both at the point of dredging and at the point of disposal for any generated waters. Sediments dredged from the waterway would be contained within the ASB fill as described below.

- **Inner Whatcom Waterway (Units 2 & 3):** Under Alternative 3, sediment dredging would be performed within the Inner Whatcom Waterway as necessary to provide for future use and maintenance of the federal navigation channel to the head of the waterway. The 1960s federal channel boundaries specify a water depth of 30 feet below MLLW from the BST area to Maple Street. A depth of 18 feet is specified from Maple Street to the head of the waterway. In the deeper portion of the waterway, the dredging cut would be established at depths at least 35 feet below MLLW. This would remove sediments where technically feasible, and would provide sufficient over-depth to allow residual sediments to be capped without impeding future maintenance of the federal channel. The design concept assumes a cap thickness of 3 feet over dredged areas with residual subsurface sediment impacts. Due to historical encroachment of the shoreline on the federal channel boundaries, many of the Inner Whatcom Waterway shoreline areas have fill and bulkheads up to or near to the pierhead line. Most of these bulkheads would require replacement and/or substantial upgrades in order to maintain shoreline stability in these areas during and after dredging. Docks may also have to be upgraded or replaced as described in Alternative 2 in order to accommodate channel channel dredging and future use. After dredging, the effective water depth (water depth at the pierhead line) will vary with location along the shoreline. The effective water depth will be controlled mostly by the type of shoreline infrastructure (i.e., nearshore fill, docks and bulkheads) that is established there. Without substantial infrastructure investments, the effective water depth for the Inner Whatcom Waterway will be significantly less in most areas than the federal channel project depth. The remedial costs of this alternative address only sediment removal. The costs of the shoreline infrastructure required to improve the effective waterway depth would be borne by area redevelopment actions.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. Actions in this area will be limited to enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap edges. These enhancements are described in Appendix D of the FS report.

- **Areas Offshore of ASB (Unit 5):** Exceedances of site-specific cleanup goals within Unit 5-B will be remediated using sub-aqueous capping. Appendix C of the FS Report describes the design concept for this area, including methods to maintain cap stability in a manner compatible with anticipated permitting requirements. The remaining areas of Unit 5 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas at this time. Additional evaluations of sediment stability will be conducted as part of engineering design. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels. Additional measures will be taken in this area only if engineering design evaluations indicate that such measures are required.

- **Areas Adjacent to BST (Unit 6):** The area south of the barge docks at the Bellingham Shipping (Units 6-B and 6-C) exceeds SMS cleanup levels. This area will be remediated using a deep-water sub-aqueous cap. Final water depths in this area will be greater than -18 feet MLLW in most areas, consistent with shoreline infrastructure and navigation uses historically conducted there. The cap will be constructed of coarse granular materials and will be designed to resist potential prop-wash erosion effects. The remaining portions of Unit 6 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **ASB (Unit 8):** Under Alternative 3, the ASB sludges would be contained within the existing ASB. Most sludges would simply be buried beneath the nearshore fill. However, the Alternative assumes that the sludges located in the outer portion of the ASB (the area not required for a nearshore fill) would be dredged and consolidated within the fill area. Construction sequencing would involve initial lowering of the water level of the ASB, followed by the removal of the wastewater treatment equipment (aerators, weirs, etc.). Dredging of sludges from the future edge of the nearshore fill would then be conducted. A berm would be constructed along this alignment. Finally, the remaining sludges would be dredged from the area outside of the berm, for consolidation within the new fill area. Because construction within the ASB would disrupt the bentonite sealant present along the

bottom and sides of the ASB, some additional measures (in addition to lowering of the water level of the ASB during construction) may be required to prevent significant water leakage through the berm during and after construction. These actions may include driving of sheet-piling, placement of new bentonite sealant, or other measures. Some residual sludges would likely remain in the dredged area of the ASB, and these would be managed by sediment capping.

Sediment Disposal

Under Alternative 3, the sediments dredged from the Waterway areas will be managed by containment in nearshore fill constructed in a portion of the ASB. The design concept estimates disposal of approximately 472,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas, and an additional 113,000 cubic yards of sediments dredged from Units 1A and 1B. Approximately 71,000 cubic yards of ASB sludges in the outer portion of the ASB would be consolidated in the fill area, along with the dredged sediments. Additional materials would be used to construct the containment berm within the ASB, and to cap the facility after placement of dredged sediments.

The principal remedial benefit associated with the ASB fill site is that the main ASB berm already exists, and does not need to be constructed. Secondly, the use of the ASB provides for consolidation of the ASB sludges as well as the dredged sediments from the Waterway.

Whether the Waterway dredging is conducted using hydraulic or mechanical dredging, the existing berms of the ASB facility would be maintained largely in their current configuration. A new berm would be constructed within the interior of the facility as described above.

Previous leachability studies conducted as part of the 2000 RI/FS and the PRDE investigation report (Anchor 2003) included evaluation of contaminant mobility under various conditions. Mobility of mercury was lowest in those tests under anoxic conditions. The design of the fill would place the dredged materials and ASB sludges below the elevation at which groundwater levels are anticipated to stabilize after facility construction. The elevated TOC content of the sediments and ASB sludges, combined with long-term groundwater saturation would tend to retain anoxic conditions within the impacted portion of the fill. Sediments from Unit 1A and 1B would be placed in upper portions of the fill, and clean sediments and/or soils would be placed on top of the final fill as a capping layer. The design and construction of the facility would provide for sediment and sludge consolidation.

The land created by the fill would be subject to further consolidation over time, due to decomposition of high-organic materials in the ASB sludges and the decomposition of woody materials in waterway sediments. This process

would be similar to the long-term settlement that occurs in solid waste landfills. Any future use of the property would need to allow for such settlement to occur. Pile-supported foundations would likely be required for most buildings, involving penetration of the pilings through the fill materials and into underlying sandy soils. Water quality evaluations conducted during design and permitting would need to address water quality issues within the fill, to ensure long-term protection of surface waters. If maintenance of the bentonite sealing layer within the fill is required for long-term surface water protection, then penetration of this layer with foundation pilings could be subject to significant limitations or could be prohibited altogether. Future development of enclosed structures within the fill area would also be subject to requirements for under-building methane-control systems, similar to those used for buildings constructed on peat deposits or for buildings on or adjacent to municipal landfills.

Long-term monitoring and maintenance and institutional controls for the nearshore fill would be required as part of the remedy.

The construction of the nearshore fill would need to be coordinated with the activities at the adjacent Central Waterfront site. This would mainly involve ensuring that construction and any future reuse of the fill area does not adversely impact groundwater conditions within the Central Waterfront site.

Costs & Schedule

The probable costs of Alternative 3 are approximately $34 million. In order of decreasing cost, this estimate address dredging and ASB site disposal of Waterway sediments, preparation and completion of the ASB facility, capping costs for harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring. Long-term monitoring costs include provisions for groundwater and vapor monitoring associated with the fill area. The costs for Alternative 3 do not include the costs required to mitigate for SEPA environmental impacts.

The construction activities in Alternative 3 can likely be completed within three construction seasons. The range of construction time requirements is 2 to 4 years, depending on dredging rates and construction sequencing. Higher dredging rates reduce the restoration time, but are logistically more difficult to maintain. For hydraulic dredging, use of high production rates significantly increases the rates of water generation requiring treatment and discharge to Bellingham Bay. With the exception of the initial and final work within ASB area, work activities would be confined to appropriate “fish windows”. Because the ASB area is not connected to Bellingham Bay, some of the initial ASB preparation and the final capping activities within the ASB will not necessarily be time-limited by the “fish windows.”

4.4.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 3.

Geology, Water and Environmental Health

Alternative 3 produces net adverse impacts under the environmental category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 3 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C), the Inner and Outer Whatcom Waterway areas, and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impacts – Construction Water Quality:** Alternative 3 involves extensive in-water construction activities associated with dredging, capping, and ASB fill construction, operation and closure. The project likely will require 3 in-water construction seasons to complete. These construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, 4) water quality monitoring during construction, and 5) further evaluation of contaminant leachability and potential measures to protect against contaminant migration via groundwater to adjacent surface waters during long-term care of the completed fill. Alternative 3 may provide the ability to use hydraulic dredging for management of some sediments. Hydraulic dredging can produce lower turbidity levels at the point of dredging than many mechanical dredging methods. However, further evaluations would need to be conducted to determine potential impacts to water quality and associated treatment requirements for produced dredge waters, because of the high production of impacted dredged waters associated with hydraulic dredging.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 3 conducts active remediation by capping in Site Units 5-B, 6-B/C and dredging and capping in the Whatcom Waterway channel. These actions reduce the potential for future resuspension of contaminated sediments in navigation areas.

- **Adverse Impact – Shoreline Destabilization:** Alternative 3 includes deep dredging in the Inner Whatcom Waterway in order to comply with the dimensions of the 1960s industrial channel. This deep dredging will tend to further destabilize existing shorelines in this area. To avoid shoreline stability failures, the shoreline will need to be stabilized with new infrastructure compatible with the deep dredging patterns. Mitigation will be required, including the construction of hardened shoreline treatments including bulkheads and over-water wharves. The potential costs to construct this type of shoreline infrastructure has been estimated at $20 to $40 million for the Inner Whatcom Waterway. These costs are not included in the remediation cost estimates of Alternative 3.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 3, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

- **Mitigated Impact – ASB Fill Settlement & Use Restrictions:** The reuse options for the ASB fill will be subject to geotechnical and environmental use restrictions. Geotechnical restrictions will be associated with primary and secondary settlement of the completed fill. This settlement is similar to the settlement that occurs with municipal landfills and will affect the construction methods for any buildings to be placed on the fill. Secondly, provisions to maintain groundwater quality could prohibit, or at least minimize, the use of foundation pilings to avoid compromising the bentonite lining of the ASB and increasing the migration potential of impacted fill leachate. The nature of the final use restrictions will be determined in future design and permitting activities and will be subject to further environmental review by Ecology and permitting agencies. Any planning for reuse of the fill area developed under Alternative 3 must take into account the effect of such restrictions.

Fish and Wildlife

Alternative 3 results in net adverse impacts to fish and wildlife. Under alternative 3 significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impacts – Construction Disturbances:** Construction of Alternative 3 includes significant construction-related habitat disturbances. These disturbances will occur in several areas, including the dredging and cap areas. Potential disturbances to fish and wildlife must be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the short-term habitat impacts associated with construction disturbances under Alternative 3.

- **Adverse Impact – Inner Whatcom Waterway Nearshore Habitat:** Through dredging of the 1960s industrial channel, Alternative 3 eliminates existing emergent shallow-water habitats at the head and along the sides of the Inner Whatcom Waterway. These impacts likely exceed the level that will be mitigated by creation of new replacement habitat in alternative site areas (i.e., at the ASB shoulder). Impact avoidance would require the use of alternative channel dimensions (as in Alternative 4, 5 and 6). In addition to the direct impacts associated with the deep dredging, additional habitat impacts will be incurred during the construction of hardened shoreline infrastructure as necessary to stabilize shorelines and support the use and maintenance of the deep-draft waterway uses in the Inner Whatcom Waterway under Alternative 3.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 3 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. However, potential adverse impacts associated with substrate changes may require mitigation through habitat gains in other areas under the alternative.

- **Beneficial Impact – Development of New Habitat:** Alternative 3 includes development of a new habitat bench within Unit 5B. This habitat benefit is significant, but is likely offset by the other habitat impacts associated with completion of the project. The treatment of

the Inner Whatcom Waterway will continue to represent a "gap" in nearshore habitat along the salmonid migration corridors (see Figure 1-3) which is not addressed by development of the new habitat bench.

Land Use, Navigation and Public Shoreline Access

As with Alternative 2, Alternative 3 was initially designed to support industrial waterfront uses, consistent with land uses that predominated in the 1960s. The same conflicts with area zoning and planned land uses that were discussed for Alternative 2 are applicable to Alternative 3. A summary of significant impacts, benefits and mitigation for Alternative 3 is provided below:

- **Beneficial Impact – Outer Whatcom Waterway Navigation Benefits:** The shoreline infrastructure in the Outer Whatcom Waterway areas is similar to that shown in Figure 3-5 and currently supports deep draft navigation uses. Alternative 3 provides for dredging of deep draft areas of the Outer Whatcom Waterway, consistent with continued deep draft use capabilities. This alignment of dredging patterns with land use and navigation needs represents a benefit of Alternative 3.

- **Adverse Impact – Conflict with Inner Whatcom Waterway Land Uses**: The Inner Whatcom Waterway dredging plan and associated infrastructure requirements under Alternative 3 conflict with planned navigation and land uses. Land use and navigation planning for the Inner Whatcom Waterway area has focused on mixed-use redevelopment, with extensive enhancements to public shoreline access and transient moorage facilities. Significant interest has also been expressed for incorporating habitat restoration into shoreline land uses where such actions are compatible with land use and navigation needs. In contrast to this planned mixed-use redevelopment, Alternative 3 conducts the remediation of the Inner Whatcom Waterway using deep dredging consistent with deep-draft industrial uses. This dredging requires construction of hardened shorelines, bulkheads and industrial shoreline infrastructure to stabilize the deep shorelines and allow maintenance and use of the target dredge depths. These actions result in conflicts with planned land uses for the Inner Whatcom Waterway. These conflicts are intrinsic to Alternative 2, 3, 7 and 8.

- **Adverse Impact – Conflict with Planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina with integrated public access and habitat enhancements. Alternative 3 remediates the ASB by constructing a nearshore fill within the ASB for management of sludges and sediments dredged

from other site areas. This cleanup approach directly conflicts with the planned aquatic reuse of the ASB. Mitigation of this impact would require remediation of the ASB as provided under other project alternatives (Alternatives 5, 6, 7 or 8).

Air and Noise

Alternative 3 involves extensive construction activities associated with project dredging, capping and fill site construction activities. These activities will take place in most areas of the site. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 3 involves extensive dredging activities, including dredging at the head of the Whatcom Waterway in the area near Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. Potential measures to mitigate impacts to these resources would need to be developed during project design and permitting. This would likely be performed as part of the Section 106 consultations as part of Army Corps of Engineers permitting. This consultation would also cover other site areas, though the potential for presence of undisturbed cultural or historical resource in these other areas is much lower.

4.5 Project Alternative 4

Cleanup Alternative 4 uses removal and upland disposal technology, in addition to institutional controls, monitored natural recovery and containment

to comply with SMS cleanup levels. The alternative uses capping in-place for management of the ASB sludges.

4.5.1 Cleanup Description

The design concept for Alternative 4 is shown in Figure 4-5. A detailed description of the alternative follows.

Actions by Site Area

Cleanup actions are described below by site unit. Dredging activities within the Whatcom Waterway are targeted on appropriate areas to support a multi-purpose Waterway concept, including a mix of deep-draft navigation, public access, transient moorage and habitat enhancement uses. Sediments dredged from the Waterway are managed by upland disposal at appropriately-permitted off-site facilities.

- **Outer Whatcom Waterway (Unit 1):** Under Alternative 4, the outer portion of the waterway would be dredged to a depth of approximately 35 feet below MLLW. The sediments removed during this dredging would be barged to an offload facility within Port-owned property. The sediments would be transferred to lined railcars for transportation to an appropriately-permitted offsite disposal facility. The cost estimates are based on the use of Subtitle D permitted landfills that can accept wet sediments for reuse as daily cover. Other disposal facilities that have appropriate environmental permits may be used, subject to applicable regulations and logistical considerations. The costs for sediment transportation and disposal under this alternative were based on pricing for eastern Washington and eastern Oregon landfills. This does not preclude potential use of alternate locations subject to final remedy design, permitting and contractor discretion. After removal of sediments to -35 feet MLLW, a thick sediment cap would be placed over residual impacted sediments. The cap would be designed to resist erosive forces of prop wash, and to minimize the potential for aquatic wildlife exposures. Based on previous sediment testing, the sediments from Units 1A and 1B appear to be suitable for beneficial reuse or PSDDA disposal, subject to final testing and suitability determinations. These sediments could potentially be reused as part of the project for capping subgrade within the Inner Whatcom Waterway. However, the fine particle size distribution within the Unit 1A/1B sediments makes this use subject to logistical and long-term stability considerations. The Alternative 4 cost estimate assumes that Unit 1A and 1B sediments that are dredged are managed by open water disposal consistent with PSDDA program requirements. Mechanical dredging methods would likely be used for the Outer Whatcom Waterway area, as hydraulic dredging is impracticable without a large area

for management of produced dredge waters and for separating entrained waters from dredge materials. Detailed dredging and construction procedures would be determined in project design and permitting.

- **Inner Whatcom Waterway (Units 2 & 3):** The design concept included in Alternative 4 assumes that the majority of the Inner Whatcom Waterway is to be managed for effective water depths of between 18 feet and 22 feet. This water depth range provides for navigation opportunities consistent with the mixed-use zoning of the waterfront properties. The central portion of the waterway is dredged to depths at least 5 feet below the planned effective water depth. A sediment cap is then applied over any residual sediments, with the cap grading from a minimum thickness of 3 feet, to a maximum thickness of 6 feet near the Log Pond. Shoreline slopes would be stabilized using appropriately designed side-slopes and materials that maximize nearshore habitat quality and quantity, while maintaining stability and providing for appropriate navigation needs within the Waterway. Under Alternative 4, the emergent tideflats at the head of the waterway are preserved, and shallow-water habitat areas along the sides of the waterway are preserved and enhanced.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. Actions in this area will be limited to enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap edges. These enhancements are described in Appendix D of the FS Report report.

- **Areas Offshore of ASB (Unit 5):** Exceedances of site-specific cleanup goals within Unit 5-B will be remediated using sub-aqueous capping. Appendix C of the FS Report describes the design concept for this area, including methods to maintain cap stability in a manner compatible with anticipated permitting requirements. The remaining areas of Unit 5 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas at this time. Additional evaluations of sediment stability will be conducted as part of engineering design. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels. Additional measures will be taken in this area only if engineering design evaluations indicate that such measures are required.

- **Areas Adjacent to BST (Unit 6):** The area south of the barge docks at the Bellingham Shipping (Units 6-B and 6-C) exceeds of SMS cleanup levels. This area will be remediated using a deep-water sub-aqueous cap. Final water depths in this area will be greater than -18 feet MLLW in most areas, consistent with shoreline infrastructure and navigation uses historically conducted there. The cap will be constructed of coarse granular materials and will be designed to resist potential prop-wash erosion effects. The remaining portions of Unit 6 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **ASB (Unit 8):** As with Alternatives 1 and 2, the ASB will be remediated using a thick sub-aqueous cap.

Sediment Disposal

Sediments removed from Waterway areas under this Alternative will be managed by disposal at a Subtitle D upland disposal facility. Subtitle D facilities are commercially available, and are designed and permitted for management of solid waste. The design of Subtitle D facilities includes a liner, a cap, a monitoring network, and institutional controls and financial assurance provisions under state and federal solid waste regulations.

The design concept for Alternative 4 estimates disposal of approximately 68,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas at upland disposal sites. An additional 113,000 cubic yards of sediments dredged from Units 1A and 1B would be managed by beneficial reuse or PSDDA disposal.

Options for transportation of dredged materials to upland disposal sites include barge, truck and rail. Barge transportation can utilize alternate offloading locations located away from the site. Such offloading facilities exist in Seattle, Vancouver B.C. and elsewhere. The sediments are generally then transferred to truck or rail for final shipment to the disposal facility. Truck transportation is commonly used for small sediment volumes. Multiple intermodal yards exist around the region where truck containers can be transloaded for final rail shipment to the disposal site. However, for large sediment volumes, truck transportation results in additional traffic burdens and is less fuel efficient than rail transportation. The design concept and cost estimate assumes the placement of temporary rail improvements at the former

GP mill site, and shipment of sediments directly from the site to the upland disposal site by rail. Stormwater management and "surge" stockpile areas are included in the project cost assumptions.

Costs & Schedule

The probable costs of Alternative 4 are approximately $21 million. The costs of Alternative 4 are the second lowest of all of the evaluated alternatives. In order of decreasing cost, this estimate addresses dredging and upland disposal of Whatcom Waterway sediments, capping costs for the ASB and harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring.

The in-water construction activities in Alternative 4 can likely be completed within a single construction season. With the exception of the ASB area, and initial preparation and final demobilization of the upland sediment offload area, work activities would be confined to appropriate "fish windows". Because the ASB area is not connected to Bellingham Bay, the capping activities within the ASB will not necessarily be time-limited by the "fish windows".

Monitoring of capped and natural recovery areas will occur under Alternative 4. Because natural recovery is only applied in areas that have already achieved compliance with cleanup standards, additional restoration time would not be required.

4.5.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 4.

Geology, Water and Environmental Health

Alternative 4 includes net beneficial impacts in the category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 4 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C), the Inner and Outer Whatcom Waterway areas, and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impact – Construction Water Quality:** Alternative 4 involves in-water construction activities that can likely be completed within 1, or at most 2 construction seasons. This alternative has a lower potential for water quality impacts than any

alternatives except for Alternative 1 and the No Action Alternative. To minimize the potential for adverse water quality impacts, these construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, and 3) water quality monitoring during construction.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 4 conducts active remediation by capping and dredging in the impacted harbor areas and in the Whatcom Waterway channel. These actions reduce the potential for future sediment resuspension in these areas.

- **Beneficial Impact – Channel Updating & Stabilization:** Alternative 4 includes updating of Whatcom Waterway channel dimensions, consistent with plans for a locally-managed multi-purpose channel. Under this alternative, dredging activities within the waterway are graded, to provide deep draft use areas in the Outer Whatcom Waterway, and to address planned land uses within the Inner Whatcom Waterway. Because the infrastructure exists in the Outer Whatcom Waterway to accommodate deep draft uses, no impacts are associated with deep dredging in that location. For the Inner Whatcom Waterway, Alternative 4 avoids the adverse impacts associated with destabilization of the existing shorelines under Alternatives 2 and 3. Rather, Alternative 4 provides for effective water depths of between 18 and 22 feet, consistent with the needs for transient moorage and planned uses for the Inner Whatcom Waterway area. Additionally, Alternative 4 provides for stabilization of the side-slopes of the Inner Whatcom Waterway without requiring extensive use of hardened shoreline infrastructure. Alternative 4 allows for shorelines to be softened using slope treatments similar to those shown in Figure 3-6, without adversely impacting navigation opportunities. This shoreline stabilization approach provides significant benefits to habitat conditions within the Inner Whatcom Waterway, as described below.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 4, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

Fish and Wildlife

Alternative 4 results in net beneficial impacts to fish and wildlife. Significant impacts, benefits and potential mitigation requirements relative to fish and wildlife include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impact – Construction Disturbances:** Construction disturbances of Alternative 4 are significant, but are less than under Alternatives 2 and 3. These short-term disturbances will occur in the dredging and cap areas shown in Figure 4-5. Potential disturbances to fish and wildlife must be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the short-term habitat impacts associated with construction disturbances under Alternative 4.

- **Beneficial Impact – Inner Whatcom Waterway Habitat:** Alternative 4 preserves and enhances existing nearshore aquatic habitats at the head and along the sides of the Inner Whatcom Waterway. The shoreline stabilization and channel patterns provided under Alternative 4 incorporate habitat enhancement in their design. The alternatives provides for large stretches of continuous habitat enhancement along important salmonid migration corridors, and provides habitat connectivity with recent restoration actions completed by the City in the Whatcom Creek Estuary and Maritime Heritage Park (see Figure 1-2).

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 4 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. However, potential adverse impacts associated with substrate changes may require mitigation through habitat gains in other areas under the alternative.

- **Beneficial Impact – Development of New Habitat:** Alternative 4 includes development of a new habitat bench within Unit 5B. This is likely to result in a net beneficial impact for fish and wildlife in conjunction with other project actions of Alternative 4.

Land Use, Navigation and Public Shoreline Access

Alternative 4 is the first of the evaluated alternatives that specifically addresses local land use and navigation plans for the Whatcom Waterway. This provides a beneficial impact under this Alternative, supporting waterfront revitalization efforts. However, the capping of the ASB under Alternative 4 offsets these benefits and results in a net impact to land use, navigation and public shoreline access under Alternative 4. A summary of significant impacts, benefits and mitigation for Alternative 4 is provided below:

- **Beneficial Impacts – Outer Whatcom Waterway Navigation:** Like Alternatives 2 and 3, Alternative 4 supports continued deep draft navigation capabilities in the Outer Whatcom Waterway where the shoreline infrastructure currently supports deep draft navigation uses. This alignment of dredging patterns with land use and navigation needs represents a benefit of Alternative 4.

- **Beneficial Impact – Inner Whatcom Waterway Land Use**: Alternative 4 includes updating of Whatcom Waterway channel dimensions, consistent with plans for a locally-managed multi-purpose channel. Alternative 4 provides for effective water depths of between 18 and 22 feet, consistent with historical authorized depths in the Inner Whatcom Waterway, and consistent with the needs for transient moorage and other uses planned for the Inner Whatcom Waterway area. Additionally, Alternative 4 provides for stabilization of the side-slopes of the Inner Whatcom Waterway without requiring extensive use of hardened shoreline infrastructure. Alternative 4 allows for shorelines to be softened using slope treatments similar to those shown in Figure 3-6, without adversely impacting navigation opportunities. Infrastructure costs are reduced while simultaneously maximizing land use flexibility and improving both habitat conditions and navigation opportunities. Effective water depths within the Inner Whatcom Waterway will be between 18 and 22 feet under this Alternative. Deeper draft vessels can be accommodated in the Outer Whatcom Waterway near the Bellingham Shipping Terminal. The navigation uses for the Inner Whatcom Waterway would accommodate transitional uses by tug boats and barges. Compatible navigation uses consistent with the long-term redevelopment of the waterfront include access by recreational vessels, whale watching boats, intermediate-draft institutional vessels (i.e., research boats), sailing ships (i.e., most “Tall Ships Festival” vessels) and most passenger-only ferries. Alternative 4

stabilizes Inner Whatcom Waterway shoreline without triggering requirements for substantial new shoreline infrastructure. This substantially reduces the mitigation costs and land use and habitat impacts associated with preceding Alternatives 2 and 3.

- **Adverse Impact – Conflicts with planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina. Alternative 4 does not remove contaminated sludges from the ASB. The capping of the ASB sludges in place would prevent future use of the area for development of an environmentally sustainable marina with integrated public access and habitat enhancements. This conflict between cleanup and planned land use represents an adverse impact of Alternative 4 that cannot be mitigated. Avoidance of this impact would require remediation of the ASB as provided under other project alternatives (Alternatives 5, 6, 7 or 8).

Air and Noise

Alternative 4 involves significant construction activities associated with project dredging and capping. These activities will take place over the course of one or two construction seasons. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 4 does not include dredging at the head of the Whatcom Waterway in the area near former Citizens Dock. This was an area that was identified during previous archaeological assessment activities as

potentially containing undisturbed historical or cultural resources. While additional historical and cultural resource review will be performed as part of the Section 106 consultations as part of project permitting, Alternative 4 has a low probability of impacting historical or archaeological resources.

4.6 Project Alternative 5

Alternative 5 uses multiple technologies to comply with SMS cleanup levels. Institutional controls, monitored natural recovery and containment are used in various portions of the site. Removal and upland disposal are used for ASB sludges and impacted sediments from outside of the ASB. The ASB sludges are treated to achieve volume reduction prior to disposal.

4.6.1 Cleanup Description

The design concept for Alternative 5 is shown in Figure 4-6. A detailed description of the alternative follows.

Actions by Site Area

Under Alternative 5 dredging activities within the Whatcom Waterway are targeted on appropriate areas to support a multi-purpose Waterway concept, including a mix of deep-draft navigation, public access, transient moorage and habitat enhancement uses. Sediments dredged from the Waterway and the sludges removed from the ASB are managed by upland disposal at appropriately-permitted off-site Subtitle D facilities. Specific actions within each site unit are described below:

- **Outer Whatcom Waterway (Unit 1):** Under Alternative 5, the outer portion of the waterway would be dredged to a depth approximately 35 feet below MLLW, as with Alternative 4. The residual sediments in this area would be capped with a thick sediment cap. The cap would provide a sufficient thickness of cap material to allow for future waterway maintenance dredging, and would provide resistance against potential erosion by prop wash. Sediments removed during this dredging would be barged to an offload facility within Port-owned property, and would be transferred to for transportation to an appropriately-permitted offsite disposal facility. The sediments from waterway Units 1A and 1B are managed by PSDDA disposal, as in Alternative 4. Mechanical dredging methods would likely be used in the Outer Whatcom Waterway area.

- **Inner Whatcom Waterway (Units 2 & 3):** The cleanup of the Inner Whatcom Waterway will be performed using the same approach as with Alternative 4. The alternative assumes that the 1960s federal channel will be updated at the head of the waterway to provide for integrated public access, habitat enhancement and navigation uses. The design concept for Alternative 5 assumes that the majority of

the Inner Whatcom Waterway is managed for effective water depths of between 18 feet and 22 feet. This water depth range provides for navigation opportunities consistent with the mixed-use zoning of the waterfront properties. Under Alternative 5, the emergent tideflats at the head of the waterway are preserved, and shallow-water habitat areas along the sides of the waterway are preserved and enhanced. At the same time, the central portion of the waterway is dredged to depths 5 feet below the planned effective water depth. A sediment cap is then applied over any residual sediments, with the cap grading from a minimum thickness of 3 feet, to a maximum thickness of 6 feet in areas near the Log Pond and Bellingham Shipping Terminal. Shoreline slopes would be stabilized using appropriate side-slopes and materials.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. Actions in this area will be limited to enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap edges. These enhancements are described in Appendix D of the FS Report.

- **Areas Offshore of ASB (Unit 5):** Exceedances of site-specific cleanup goals within Unit 5-B will be remediated using sub-aqueous capping. Appendix C of the FS Report describes the design concept for this area, including methods to maintain cap stability in a manner compatible with anticipated permitting requirements. The remaining areas of Unit 5 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these areas at this time. Additional evaluations of sediment stability will be conducted as part of engineering design. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels. Additional measures will be taken in this area only if engineering design evaluations indicate that such measures are required.

- **Areas Near Bellingham Shipping Terminal (Unit 6):** The area south of the barge docks at the Bellingham Shipping (Units 6-B and 6-C) exceeds SMS cleanup levels. This area will be remediated using a deep-water sub-aqueous cap. Final water depths in this area will be greater than -18 feet MLLW in most areas, consistent with shoreline infrastructure and navigation uses historically conducted there. The cap will be constructed of coarse granular materials and will be designed to resist potential prop-wash erosion effects. The remaining portions of Unit 6 comply with site-specific cleanup goals. No sediment capping or dredging is proposed for these

areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **Starr Rock (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup levels. No sediment capping or dredging is proposed for these areas. These areas will be monitored to document the continued effectiveness of natural recovery at complying with cleanup levels.

- **ASB (Unit 8):** Under Alternative 5, the ASB sludges would be removed from the waterfront. The design concept is based on a five-step process. First, the water level in the ASB will be lowered and the connection between the ASB and the outfall plugged. Second, the water treatment equipment (aerators, weirs, etc.) will be removed, and the tops of the berms removed. These berm materials consist of clean sand and stone materials used to construct the ASB and can be reused within other portions of the project area. The exterior of the berm will be reduced in elevation to approximately 16 feet above MLLW. The interior of the berm will be removed to elevations approximately 10 feet above MLLW. Sheet piling will be driven along the berm to prevent migration of impacted water through the berm during dredging. Third, the majority of the ASB sludges will be removed by hydraulic dredging. The hydraulic dredge slurry will be treated in centrifuges or hydrocyclones to separate sludge solids form the entrained waters. Solids separated from the dredge slurry will be shipped by rail for upland disposal. Water from the hydraulic dredging will be returned to the ASB in a closed-loop system, to minimize the overall generation of contaminated waters. The use of hydraulic dredging and maintenance of a water layer overlying the sludges during removal will also minimize odors and potential wildlife exposures during sludge removal. During the fourth step, the impacted waters from the ASB will be pumped out, treated to remove suspended and dissolved contaminants, and will be discharged to the sanitary sewer. If sewer capacity is limited, the treated waters will be managed using a permitted temporary surface water discharge. Finally, the residual solids within the dewatered ASB will be removed by land-based excavation equipment. By conducting this final phase of removal without overlying water, the result will maximize sludge removal and minimize residual contamination. Following cleanout of the sludges, the sheet-piling may be removed from the ASB, the ASB filled to appropriate elevations with surface water, and the berm opened. Some additional impacted sediments will be generated for upland disposal at the time the new access channel to the ASB (Unit 2-B) is created.

Sediment Disposal

Sediments removed from Waterway under this Alternative will be managed by disposal in appropriately-permitted upland disposal sites. The design concept for Alternative 5 estimates disposal of approximately 76,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas and the disposal of approximately 412,000 cubic yards of sludges removed from the ASB. An additional 113,000 cubic yards of sediments dredged from Units 1A and 1B would be managed by beneficial reuse or PSDDA disposal.

The design concept for Alternative 5 assumes that dredged sediments and ASB sludges are shipped by rail to the upland disposal site. Rail shipment is more fuel efficient and provides fewer traffic conflicts than truck transportation. As with Alternative 4, the Alternative 5 design concept and cost estimate assumes the placement of temporary rail improvements at the former GP mill site. Stormwater management and "surge" stockpile areas are included in the project cost assumptions.

Costs & Schedule

The probable costs of Alternative 5 are approximately $42 million. In order of decreasing cost, this estimate addresses removal and disposal of the ASB sludges, dredging and upland disposal of Whatcom Waterway sediments, capping costs for the Waterway and harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring. Under Alternative 5, clean sediments and stone from the ASB berms are reused within the project as part of capping, shoreline stabilization and habitat enhancement actions.

Because of the work within the ASB, the construction activities are more complex than those in alternative 4, resulting in a longer construction period. The construction of alternative 5 will likely require a three-phase construction cycle, taking place over a 3 to 4 year period. The initial ASB preparation and waterway dredging activities will take place during the first construction phase. The second construction phase will involve ASB sludge removal, dewatering and final ASB cleanout. The final construction phase will involve opening of the ASB berm, completion of final dredging and capping activities within the waterway areas. The first and third phases of construction will be restricted to appropriate "fish windows." The second construction phase will not involve activities in areas connected to surface water, and will not necessarily be subject to "fish window" limitations.

Monitoring of capped and natural recovery areas will occur under Alternative 5. Because natural recovery is only applied in areas that have already achieved compliance with cleanup standards, additional restoration time would not be required.

4.6.2 Impacts, Benefits and Mitigation

Alternative 5 provides for substantial net benefits under three of the five environmental categories evaluated in this EIS, and mitigation of potential impacts under the other two categories. Table 4-2 summarizes the impacts, benefits and mitigation associated with Alternative 5.

Geology, Water and Environmental Health

Alternative 5 provides net beneficial impacts under the environmental category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 5 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C), the Inner and Outer Whatcom Waterway areas, and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impact – Construction Water Quality:** Alternative 5 involves extensive construction activities, requiring two in-water construction seasons, and 1-2 additional years for remediation of ASB sludges. To minimize the potential for adverse water quality impacts, these construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, and 3) water quality monitoring during construction.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 5 conducts active remediation by capping and dredging in the impacted harbor areas and in the Whatcom Waterway channel. These actions reduce the potential for future sediment resuspension in these areas.

- **Beneficial Impact – Channel Updating & Stabilization:** Alternative 5 includes updating of Whatcom Waterway channel dimensions, consistent with plans for a locally-managed multi-purpose channel. Under this alternative, dredging activities within the waterway are graded, to provide deep draft use areas in the Outer Whatcom Waterway, and to address multiple land use priorities for the Inner Whatcom Waterway. Because the infrastructure exists in the Outer Whatcom Waterway to accommodate deep draft uses, no impacts are associated with deep

dredging in that location. For the Inner Whatcom Waterway, Alternative 5 avoids the adverse impacts associated with destabilization of the existing shorelines under Alternatives 2 and 3. Rather, Alternative 5 provides for effective water depths of between 18 and 22 feet, consistent with the needs for transient moorage and planned land uses within the Inner Whatcom Waterway area. Additionally, Alternative 5 provides for stabilization of the side-slopes of the Inner Whatcom Waterway without requiring extensive use of hardened shoreline infrastructure. Alternative 5 allows for shorelines to be softened using slope treatments similar to those shown in Figure 3-6, without adversely impacting navigation opportunities. This shoreline stabilization approach provides significant benefits to habitat conditions within the Inner Whatcom Waterway, as described below.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 5, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

- **Beneficial Impact -- Berm Material Reuse:** Alternative 5 provides for reuse of clean sand and stone materials from the ASB berm. These materials can be used during site cleanup, habitat enhancement and area redevelopment activities. Material reuse conserves environmental resources, and avoids the need for quarrying of new materials from off-site locations. This provides a net environmental benefit relative to preceding project Alternatives.

Fish and Wildlife

Alternative 5 produces a substantial net environmental benefit for fish and wildlife. The alternative incorporates habitat enhancements within the Inner Whatcom Waterway, at the shoulder of the ASB and within the ASB interior. Significant impacts, benefits and potential mitigation requirements relative to fish and wildlife include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impact – Construction Disturbances:** Construction activities of Alternative 5 are significant, but are less than under Alternatives 2 and 3. These short-term disturbances will occur in the dredging and cap areas shown in Figure 4-6. The removal of the ASB sludges is conducted prior to opening of the ASB to

Bellingham Bay, reducing potential for impacts during this portion of the work. Potential disturbances to fish and wildlife can be mitigated through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the short-term habitat impacts associated with construction disturbances under Alternative 5.

- **Beneficial Impact – Inner Whatcom Waterway Habitat:** Alternative 5 preserves and enhances existing nearshore aquatic habitats at the head and along the sides of the Inner Whatcom Waterway. This represents a benefit relative to other project alternatives (i.e., Alternatives 2, 3, 7 and 8) that permanently disrupt these emergent habitat areas. The shoreline stabilization and channel patterns provided under Alternative 5 specifically incorporate habitat enhancement in their design. The alternatives provides for large stretches of continuous habitat enhancement along important salmonid migration corridors, and provides habitat connectivity with recent restoration actions completed by the City in the Whatcom Creek Estuary and Maritime Heritage Park (see Figure 1-2). These benefits are achieved under Alternative 5 without adversely impacting shoreline land uses or anticipated navigation opportunities within the Inner Whatcom Waterway. Some conversion of nearshore habitat to deep water habitat is required to develop the marina access channel in Unit 2-B, but this change is offset by net habitat benefits achieved in other portions of the waterway and parts of the site.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 5 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. However, potential adverse impacts associated with substrate changes may require mitigation through habitat gains in other areas under the alternative.

- **Beneficial Impact – Unit 5-B Capping Area:** Alternative 5 achieves development of a new habitat bench within Unit 5B. This habitat benefit is significant. Under Alternative 5, this habitat area is contiguous with habitat enhancement areas in the Inner Whatcom Waterway, and with new habitat areas developed inside the restored ASB.

- **Beneficial Impact – Aquatic Reuse of ASB:** Alternative 5 also provides for sludge cleanout of the ASB, including opening of the remediated facility for future aquatic uses. This results in the development of 4,500 linear feet of new nearshore migration corridors for juvenile salmonids, and restoration of over 28 acres of new open water habitat.

Land Use, Navigation and Public Shoreline Access

Alternative 5 directly addresses identified land use, navigation and public shoreline access plans for the New Whatcom area. Like Alternative 4, the cleanup approach provides for development of a multi-purpose channel in the Whatcom Waterway. In addition, the alternative provides for aquatic reuse of the ASB for development of an environmentally sustainable marina with integrated public access and habitat enhancements. Alternative 5 provides net beneficial impacts under the categories of land use, navigation and public shoreline access. A summary of significant impacts, benefits and mitigation for Alternative 5 is provided below:

- **Beneficial Impacts – Outer Whatcom Waterway Navigation:** Like Alternatives 2, 3, and 4, Alternative 5 supports continued deep draft navigation capabilities in the Outer Whatcom Waterway where the shoreline infrastructure currently supports deep draft navigation uses. This alignment of dredging patterns with land use and navigation needs represents a benefit of Alternative 5.

- **Beneficial Impact – Inner Whatcom Waterway Land Use**: Alternative 5 includes updating of Whatcom Waterway channel dimensions, consistent with plans for a locally-managed multi-purpose channel. Alternative 5 provides for effective water depths of between 18 and 22 feet, consistent with historical authorized depths in the Inner Whatcom Waterway, and consistent with the needs for transient moorage and other uses planned for the Inner Whatcom Waterway area. Additionally, Alternative 5 provides for stabilization of the side-slopes of the Inner Whatcom Waterway without requiring extensive use of hardened shoreline infrastructure. Alternative 5 allows for shorelines to be softened using slope treatments similar to those shown in Figure 3-6, without adversely impacting navigation opportunities. Infrastructure costs are reduced while simultaneously maximizing land use flexibility and improving both habitat conditions and

navigation opportunities. Effective water depths within the Inner Whatcom Waterway will be between 18 and 22 feet under this Alternative. Deeper draft vessels can be accommodated in the Outer Whatcom Waterway near the Bellingham Shipping Terminal. The navigation uses for the Inner Whatcom Waterway would accommodate transitional uses by tug boats and barges. Compatible navigation uses consistent with the long-term redevelopment of the waterfront include access by recreational vessels, whale watching boats, intermediate-draft institutional vessels (i.e., research boats), sailing ships (i.e., most "Tall Ships Festival" vessels) and most passenger-only ferries. Alternative 5 stabilizes Inner Whatcom Waterway shoreline without triggering requirements for substantial new shoreline infrastructure. This substantially reduces the cost, land use and habitat impacts associated with preceding Alternatives 2 and 3.

- **Beneficial Impact – Consistency with Planned ASB Reuse:** The ASB has been identified in previous land use studies as the preferred location for development of a future environmentally sustainable marina. Alternative 5 removes contaminated sludges from the ASB and reconnects the remediated ASB to surface waters of Bellingham Bay using an access channel constructed in Unit 2-B. This cleanup approach allows for aquatic reuse of the ASB as part of waterfront revitalization efforts, consistent with waterfront design concepts shown in Figure 3-7 and Appendix E.

Air and Noise

Alternative 5 involves significant construction activities associated with project dredging and capping activities. These activities will take place over the course of three to four construction seasons. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust

emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 5 does not include dredging at the head of the Whatcom Waterway in the area near former Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. While additional historical and cultural resource review will be performed as part of the Section 106 consultations as part of project permitting, Alternative 5 has a low probability of impacting historical or archaeological resources.

4.7 Project Alternative 6

Cleanup Alternative 6 is in most respects the same as Alternative 5. The difference between the alternatives, is that under Alternative 6 additional dredging is conducted adjacent to the Bellingham Shipping Terminal. Other features of the Alternative, including the cleanout of the ASB and the remedial approach to the Inner Whatcom Waterway and Harbor areas are the same as in Alternative 5.

4.7.1 Cleanup Description

The design concept for Alternative 6 is shown in Figure 4-7. A detailed description of the Alternative follows:

Actions by Site Area

Because many aspects of this alternative are the same as with Alternative 5, the alternative description below focuses only on areas of difference between the two cleanup alternatives. Both conduct remediation of the ASB using removal, treatment and upland disposal technologies. They both remediate the Inner Whatcom Waterway with dredging and capping, consistent with the vision of a locally-managed multi-purpose channel. Remediation activities outside of the waterway are also similar, including development of a cap and habitat bench along the ASB shoulder (Unit 5-B) and capping in the barge dock area (Unit 6B and 6C). The principal difference between the two alternatives is the extent of dredging near the Bellingham Shipping Terminal (Unit 1-C).

Under Alternative 5, the extent of dredging provides for maintenance of the 30-ft federal channel in the Outer Whatcom Waterway. This requires dredging to depths of at least 35 feet below MLLW. Residual sediments are capped with a thick layer of sediment. In contrast, Alternative 6 conducts sediment removal in the Unit 1-C area to the extent technically practicable. Under this alternative, the depth of dredge cuts would be increased, in most areas extending dredging to the interface with clean native sediments. The depth of

dredging under Alternative 6 would range from 35 feet to 41 feet below MLLW in Unit 1-C. The dredging would need to address geotechnical and structural integrity limitations associated with existing piers and structures in the terminal area. However, it is expected that most portions of Unit 1C could be remediated, without requiring subsequent application of a thick cap.

Sediment Disposal

As with Alternative 5, all impacted sediments dredged from the Waterway and all of the sludges removed from the ASB would be managed by upland disposal at appropriately permitted facilities. Alternative 6 does not involve the creation of new disposal sites within Bellingham Bay.

The design concept for Alternative 6 estimates disposal of approximately 118,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas and the disposal of approximately 412,000 cubic yards of sludges removed from the ASB. An additional 113,000 cubic yards of sediments dredged from Units 1A and 1B would be managed by beneficial reuse or PSDDA disposal.

Transportation of sediments for upland disposal would be conducted by rail to minimize fuel use and avoid potential traffic impacts. The design concept and cost estimate assumes the placement of supplemental temporary rail improvements at the former GP mill site. Stormwater management and "surge" stockpile areas are included in the project cost assumptions.

Costs & Schedule

The probable costs of Alternative 6 are approximately $44 million. The costs of in order of decreasing cost, this estimate addresses removal and disposal of the ASB sludges, dredging and upland disposal of Whatcom Waterway sediments, capping costs for the portions of the Waterway and harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring. Under Alternative 6, clean sediments and stone from the ASB berms are reused within the project as part of capping, shoreline stabilization and habitat enhancement actions.

The schedule and phasing of construction activities under Alternative 6 are similar to those under Alternative 5. The work will likely require a three-phase construction cycle, taking place over a 3 to 4 year period. The initial ASB preparation and waterway dredging activities will take place during the first construction phase. The second construction phase will involve ASB sludge removal, dewatering and final cleanout. The final construction phase will involve opening of the ASB berm, completion of final dredging and capping activities within the waterway areas. The first and third phases of construction will be restricted to appropriate "fish windows." The second construction phase will not involve activities in areas connected to surface water, and will not necessarily be subject to "fish window" limitations.

Monitoring of capped and natural recovery areas will occur under Alternative 6. Because natural recovery is only applied in areas that have already achieved compliance with cleanup standards, additional restoration time would not be required.

4.7.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the impacts, benefits and mitigation associated with Alternative 6. The Alternative and its environmental impacts/benefits are very similar to Alternative 5.

Geology, Water and Environmental Health

As with Alternative 5, Alternative 6 provides a significant net environmental benefit under the category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 6 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C), the Inner and Outer Whatcom Waterway areas, and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impact – Construction Water Quality:** Alternative 6 involves extensive construction activities, requiring two in-water construction seasons, and 1-2 additional years for remediation of ASB sludges. To minimize the potential for adverse water quality impacts, these construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, and 3) water quality monitoring during construction.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 6 conducts active remediation by capping and dredging in the impacted harbor areas and in the Whatcom Waterway channel. These actions reduce the potential for future sediment resuspension in these areas.

- **Beneficial Impact – Channel Updating & Stabilization:** Alternative 6 includes updating of Whatcom Waterway channel dimensions, consistent with plans for a locally-managed multi-purpose channel. Under this alternative, dredging activities within

the waterway are graded, to provide deep draft use areas in the Outer Waterway, and to address multiple land use priorities for the Inner Whatcom Waterway. Because the infrastructure exists in the Outer Whatcom Waterway to accommodate deep draft uses, no impacts are associated with deep dredging in that location. For the Inner Whatcom Waterway, Alternative 6 avoids the adverse impacts associated with destabilization of the existing shorelines under Alternatives 2 and 3. Rather, Alternative 6 provides for effective water depths of between 18 and 22 feet, consistent with the needs for transient moorage and other uses planned for the Inner Whatcom Waterway area. Additionally, Alternative 6 provides for stabilization of the side-slopes of the Inner Whatcom Waterway without requiring extensive use of hardened shoreline infrastructure. Alternative 6 allows for shorelines to be softened using slope treatments similar to those shown in Figure 3-6, without adversely impacting navigation opportunities. This shoreline stabilization approach provides significant benefits to habitat conditions within the Inner Whatcom Waterway, as described below.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 6, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

- **Beneficial Impact – ASB Sludge Remediation:** Alternative 6 conducts active remediation of the ASB using dredging, dewatering treatment and upland disposal.

- **Beneficial Impact -- Berm Material Reuse:** Alternative 6 provides for reuse of clean sand and stone materials from the ASB berm. These materials can be used during site cleanup, habitat enhancement and area redevelopment activities. Material reuse conserves environmental resources, and avoids the need for quarrying of new materials from off-site locations. This provides a net environmental benefit relative to other project Alternatives.

Fish and Wildlife

As with Alternative 5, Alternative 6 provides for substantial net beneficial impacts benefit for fish and wildlife. The alternative incorporates significant habitat enhancements within the Inner Whatcom Waterway, at the shoulder of the ASB and within the ASB interior. There are no significant differences between Alternatives 5 and 6 with respect to fish and wildlife.

Land Use, Navigation and Public Shoreline Access

Like Alternative 5, Alternative 6 directly addresses identified land use, navigation and public shoreline access priorities for the New Whatcom area. The cleanup approach provides for development of a multi-purpose channel in the Whatcom Waterway. In addition, the alternative provides for aquatic reuse of the ASB for development of an environmentally sustainable marina with integrated public access and habitat enhancements. Alternative 6 provides a net benefit under the categories of land use, navigation and public shoreline access.

The main difference between Alternatives 5 and 6 is the completion of additional dredging in the Outer Whatcom Waterway near the Bellingham Shipping Terminal. This expanded dredging may permit future deepening of the Outer Whatcom Waterway should a need for additional depth be identified. This represents a beneficial land use impact in that it provides additional long-term navigation and land use flexibility beyond that provided in Alternative 5. However, at this time there are no identified needs for that additional depth.

Other land use, navigation and public shoreline access benefits of Alternative 6 are the same as with Alternative 5. These benefits are summarized in Table 4-2.

Air and Noise

Air and noise impacts of Alternative 6 are similar to those of Alternative 5. As with Alternative 5, these impacts are associated with significant construction activities associated with project dredging and capping activities. These activities will take place over the course of three to four construction seasons. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site.

These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 6 does not include dredging at the head of the Whatcom Waterway in the area near former Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. While additional historical and cultural resource review will be performed as part of the Section 106 consultations as part of project permitting, Alternative 6 has a low probability of impacting historical or archaeological resources.

4.8 Project Alternative 7

Alternative 7 uses the same technologies as Alternatives 5 and 6 to comply with SMS cleanup levels. These include institutional controls, monitored natural recovery, containment, removal & disposal, treatment and reuse & recycling. The elements of Alternative 7 and the differences between it and alternatives 5 and 6 are described below by site Unit.

4.8.1 Cleanup Description

The design concept for Alternative 7 is shown in Figure 4-8. A detailed description of the alternative follows.

Actions by Site Area

Like Alternative 5 and 6, Alternative 7 uses a mix of technologies to accomplish the remediation of the Whatcom Waterway site. The ASB is remediated using removal, treatment and upland disposal technologies, consistent with alternatives 5 and 6. The Outer Whatcom Waterway areas are similarly remediated by dredging and upland disposal, as in Alternative 6. Unlike the preceding Alternatives, Alternative 7 removes sediment from the Inner Whatcom Waterway consistent with the dimensions of the 1960's industrial channel.

Under Alternative 7 dredging is conducted consistent with the dredge prisms used in Alternative 2 and Alternative 3. Impacted sediments that are more than 5 feet below the 1960s channel project depth are capped in place, using a thick sediment cap. Capping may also be used in nearshore berth areas where full sediment removal is technically impracticable, or where the shoreline infrastructure does not allow sediments to be removed without compromising side-slope stability or the integrity of existing structures.

Other aspects of Alternative 7 remain the same as in alternative 6. These include the capping of the ASB shoulder and barge dock areas, the enhancements to the Log Pond shoreline, and the use of monitored natural recovery for other bottom areas that currently comply with site cleanup levels.

Sediment Disposal

Sediments removed from the Waterway under Alternative 7 will be managed by disposal in appropriately-permitted upland disposal sites. The design concept for Alternative 7 estimates disposal of approximately 479,000 cubic yards of sediments dredged from the Outer and Inner Whatcom Waterway areas and the disposal of approximately 412,000 cubic yards of sludges removed from the ASB. This represents an increase of 113,000 cubic yards of sediment disposal over that provided in Alternative 6.

As with Alternative 6, the design concept for Alternative 7 assumes that dredged sediments and ASB sludges are shipped by rail to the upland disposal site. Rail shipment is more fuel efficient and provides fewer traffic conflicts than truck transportation.

Costs & Schedule

The probable costs of Alternative 7 are $74 million. The costs of in order of decreasing cost, this estimate addresses dredging and upland disposal of the 1960s federal channel sediments, removal and disposal of the ASB sludges, capping costs for the portions of the Waterway and harbor areas, enhancements to the Log Pond shoreline, and provisions for long-term monitoring.

Like Alternatives 2 and 3, implementation of Alternative 7 must be integrated with shoreline infrastructure upgrades along the Inner Whatcom Waterway shoreline. This will increase the time required for project design and permitting relative to Alternative 6. The additional dredging involved in Alternative 7 also increases the duration and complexity of project construction activities. Alternative 7 is likely to require an additional year of construction over that required in Alternative 6.

Monitoring of capped and natural recovery areas will occur under Alternative 7. Because natural recovery is only applied in areas that have already achieved compliance with cleanup standards, additional restoration time would not be required for natural recovery to occur.

4.8.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 7.

Geology, Water and Environmental Health

Alternative 7 produces net adverse impacts under the category including geology, water and environmental health. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 7 produces a beneficial impact through remediation and compliance with site

cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in the ASB Shoulder (Unit 5-B) area, the Barge Dock (Unit 6-B/C), the Inner and Outer Whatcom Waterway areas, and within the ASB. Monitored natural recovery and institutional controls are used to remediate other areas.

- **Mitigated Impacts – Construction Water Quality:** Alternative 7 involves extensive in-water construction activities associated with dredging and capping. The project will also trigger the need for additional shoreline infrastructure improvements in the Inner Whatcom Waterway. The project likely will likely require 4 in-water construction seasons to complete, plus additional time to remediate the ASB and upgrade shoreline infrastructure. These construction activities will need to be mitigated to avoid adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, 3) water quality monitoring during construction, and 4) coordination of cleanup and shoreline infrastructure projects to minimize water quality disturbances.

- **Beneficial Impact – Control of Sediment Resuspension:** Alternative 7 conducts active remediation by capping in Site Units 5-B, 6-B/C and dredging and capping in the Whatcom Waterway channel. These actions reduce the potential for future resuspension of contaminated sediments in navigation areas.

- **Adverse Impact – Shoreline Destabilization:** Alternative 7 includes deep dredging in the Inner Whatcom Waterway in order to comply with the dimensions of the 1960s industrial channel. This deep dredging will tend to further destabilize existing shorelines in this area. To avoid shoreline stability failures, the shoreline will need to be stabilized with new infrastructure compatible with the deep dredging patterns. To sustain use of the deep navigation depths, mitigation will be required, including the construction of hardened shoreline treatments including bulkheads and over-water wharves will be required. The potential costs to construct this type of shoreline infrastructure have been estimated at $20 to $40 million for the Inner Whatcom Waterway. These costs are not included in the remediation cost estimates of Alternative 7.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond cap. Under Alternative 7, these erosional areas would be corrected,

resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

- **Beneficial Impact – Berm Material Reuse:** Alternative 7 provides for reuse of clean sand and stone materials from the ASB berm. These materials can be used during site cleanup, habitat enhancement and area redevelopment activities. Material reuse conserves environmental resources, and avoids the need for quarrying of new materials from off-site locations. This provides a net environmental benefit relative to project Alternative 1-4 and the No Action Alternative.

Fish and Wildlife

Alternative 7 includes a mix of benefits and impacts to fish and wildlife. Benefits are achieved through restoration of aquatic uses in the ASB, and development of a habitat bench offshore of the ASB. Impacts are incurred in the Inner Whatcom Waterway associated with the destruction of emergent nearshore habitat and the requirements for hardened shoreline infrastructure to stabilize Inner Whatcom Waterway shorelines. Habitat improvements may be sufficient to mitigate for project impacts, though additional review would need to be conducted during remedial design and permitting. Significant impacts, benefits and potential mitigation requirements associated with Alternative 7 include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impact – Construction Disturbances:** Construction of Alternative 7 includes significant construction-related habitat disturbances. These disturbances will occur in several areas, over four construction seasons. Potential disturbances to fish and wildlife must be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting. These measures are considered likely to mitigate the short-term habitat impacts associated with construction disturbances under Alternative 7.

- **Mitigated Impact -- Inner Whatcom Waterway Habitat:** Through its aggressive dredging of the 1960s industrial channel, Alternative 7 triggers the permanent destruction of emergent

shallow-water habitats at the head and along the sides of the Inner Whatcom Waterway. These impacts are integral to the alternative and cannot be mitigated except by creation of new replacement habitat in alternative site areas. Impact avoidance would require the use of alternative channel dimensions (as in Alternative 4, 5 and 6). In addition to the direct impacts associated with the deep dredging, additional habitat impacts will be incurred during the construction of hardened shoreline infrastructure as necessary to stabilize shorelines and support the use and maintenance of the deep draft waterway uses in the Inner Whatcom Waterway under Alternative 7. However, because Alternative 7 includes significant development of new nearshore habitat, it appears that the impacts to habitat in the Inner Whatcom Waterway are mitigated within the Alternative.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 7 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. However, potential adverse impacts associated with substrate changes may require mitigation through habitat gains in other areas under the alternative.

- **Beneficial Impact – Development of New Habitat:** Alternative 7 includes development of new premium nearshore habitat in the location of the habitat bench within Unit 5B, as in preceding alternatives 1 through 6.

- **Mitigated Impact -- Alternative ASB Access Channel:** Under Alternative 7, the alignment of the marina and the placement of the marina access channel may require modification to avoid conflicts with navigation traffic associated with the industrial channel. The alternative alignment will require a greater disruption to existing shallow-water areas offshore of the ASB, and will reduce the area available for habitat bench development. However, it is likely that Alternative 7 maintains sufficient habitat enhancement to mitigate for the effects of this change.

- **Beneficial Impact – ASB Habitat Gains:** Like Alternatives 5 and 6, Alternative 7 provides for sludge cleanout of the ASB, including opening of the remediated facility for future aquatic uses. This enables development of nearly 4,500 linear feet of new nearshore migration corridors for juvenile salmonids, and development of over 28 acres of new open water habitat.

Land Use, Navigation and Public Shoreline Access

For the ASB and Outer Whatcom Waterway, the land use benefits and impacts of Alternative 7 are identical to those of Alternatives 5 and 6. The principal difference for Alternative 7 is the reintroduction of a conflict (as in Alternatives 2 and 3) between the cleanup alternative and planned land uses within the Inner Whatcom Waterway. This conflict results in net adverse impacts for land use, navigation and public access.

As with Alternatives 2 and 3, Alternative 7 conducts dredging of the Inner Whatcom Waterway based on the 1960s industrial channel dimensions. That channel was established for an industrial land use pattern that is inconsistent with current zoning and redevelopment planning. Further, the infrastructure required to fully implement the 1960s federal channel was never fully developed, resulting in shorelines in most of the Inner Whatcom Waterway area that are incapable of achieving an effective water depth consistent with the 1960s channel dimensions without additional stabilization. These shorelines were constructed earlier based on the historical 18-foot waterway depth that existed prior to the 1960s.

As with Alternatives 2 and 3, the Implementation of Alternative 7 poses a significant source of conflict with current planned land use through inconsistency of dredging patterns with planned land uses and navigation requirements, and through requirements for new hardened shoreline infrastructure to stabilize project area shorelines. As with Alternatives 2 and 3, these impacts are significant and cannot be mitigated, except by selecting alternative dredging patterns (as in Alternatives 4, 5 or 6).

Air and Noise

Alternative 7 increases the quantity of construction activities associated with project dredging and capping. Additional impacts will be associated with the construction of new shoreline infrastructure required in the Inner Whatcom Waterway. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

Potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality

control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 7 involves extensive dredging activities, including dredging at the head of the Whatcom Waterway in the area near Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. Potential measures to mitigate impacts to these resources would need to be developed during project design and permitting. This would likely be performed as part of the Section 106 consultations as part of Army Corps of Engineers permitting. This consultation would also cover other site areas, though the potential for presence of undisturbed cultural or historical resource in these other areas is much lower.

4.9 Project Alternative 8

Alternative 8 is the last of the alternatives evaluated in the Feasibility Study. The Alternative uses the same range of technologies evaluated for Alternatives 5, 6 and 7 to comply with SMS cleanup levels. However, the extent of dredging and upland disposal is expanded under Alternative 8 relative to the preceding alternatives.

4.9.1 Cleanup Description

The design concept for Alternative 8 is shown in Figure 4-9. A detailed description of the alternative follows.

Actions by Site Area

Alternative 8 manages most site cleanup areas through sediment removal and upland disposal. Like preceding alternatives, Alternative 8 conducts removal and upland disposal for the sludges within the ASB and for sediments within the Waterway navigation areas. However, Alternative 8 also removes sediments in outlying portions of the site, including areas addressed by capping and monitored natural recovery under other alternatives.

- **Outer Whatcom Waterway (Unit 1):** Dredging of the Outer Whatcom Waterway is conducted the same as for Alternatives 6 and 7. Dredging is conducted to native bottom sediments except where this is not technically feasible. Sediments are managed by upland disposal, except for those sediments of Unit 1A and 1B that may be suitable for beneficial reuse or PSDDA disposal.

- **Inner Whatcom Waterway (Units 2 & 3):** Like Alternatives 2, 3 and 7, this alternative conducts dredging within the Inner Whatcom Waterway as necessary to provide for future use and maintenance of the federal navigation channel to the head of the waterway. The 1960s federal channel boundaries specify a water depth of 30 feet below MLLW from the BST area to Maple Street. A depth of 18 feet is specified from Maple Street to the head of the waterway. In the deeper portion of the waterway, the dredging cut would be established at depths at least 35 feet below MLLW. This would remove sediments where technically feasible, and would provide sufficient over-depth to allow residual sediments to be capped without impeding future maintenance of the federal channel. The design concept assumes a cap thickness of 3 feet over dredged areas with residual subsurface sediment impacts. Due to historical encroachment of the shoreline on the federal channel boundaries, many of the Inner Whatcom Waterway shoreline areas have fill and bulkheads up to or near to the pierhead line. Most of these bulkheads would require replacement and/or substantial upgrades in order to maintain shoreline stability in these areas during and after dredging. Docks may also have to be upgraded or replaced as described in Alternatives 2, 3 and 7 in order to accommodate channel dredging and future use. Containment by capping with appropriate institutional controls will be required for areas where removal is not technically feasible.

- **Log Pond (Unit 4):** The Log Pond area was previously remediated as part of an Interim Action implemented in 2000. Subsequent monitoring has demonstrated the protectiveness of the subaqueous cap, and the effectiveness of habitat enhancement actions completed as part of that project. Actions in this area will be limited to enhancements to the shoreline edges of the cap, to ensure long-term stability of the cap edges. These enhancements are described in Appendix D of the FS report.

- **Harbor Areas (Units 5, 6 & 7):** Under Alternative 8 dredging with upland disposal will be implemented in Unit 5 (ASB shoulder area), Unit 6 (Barge Dock areas) and Unit 7 (Starr Rock area). Sediments that currently exceed cleanup standards, as well as those that currently comply with cleanup standards would be removed. As with portions of the Inner Whatcom Waterway, some residual sediments would remain in areas where removal was not technically feasible. Some institutional controls, monitoring and/or containment would likely be required in portions of Units 5, 6 and 7.

- **ASB (Unit 8):** As with Alternatives 5, 6 and 7, the ASB sludges are removed, treated to reduce volume and are disposed at a permitted

upland disposal facility. Removal methods are the same as in Alternatives 5, 6 and 7.

Sediment Disposal

Sediments removed from Waterway under Alternative 8 will be managed by disposal in appropriately-permitted upland disposal sites. The design concept for Alternative 8 estimates disposal of approximately 1.26 million cubic yards of dredged sediments and the disposal of approximately 412,000 cubic yards of sludges removed from the ASB. This is a dramatic increase in the disposal volumes over the preceding alternatives.

Costs & Schedule

The probable costs of Alternative 8 are approximately $146 million. This cost is nearly double that of Alternative 7, and is over three times higher than the cost of Alternatives 5 and 6.

The implementation of Alternative 8 will require extensive design and permitting prior to initiation of construction. In areas of the Inner Whatcom Waterway, project planning must be coordinated with future shoreline infrastructure improvements. A design and permitting period of 3 to 6 years is estimated.

The additional dredging involved in Alternative 8 will result in a substantial increase to the duration of project construction. All of the additional dredging will involve work in restricted “fish windows.” The project is expected to require between 5 and 7 construction seasons, with in-water work activities during each of those seasons. Including project design and permitting, the restoration time for Alternative 8 is estimated at 8 to 13 years.

Monitoring will likely be required in some areas where removal of sediments is not technically feasible and the application of capping and/or natural recovery is required. As with preceding alternatives, capping is assumed for these areas, resulting in no additional restoration time to achieve compliance with cleanup levels in these areas..

4.9.2 Impacts, Benefits and Mitigation

Table 4-2 summarizes the environmental impacts, benefits and mitigation associated with Alternative 8.

Geology, Water and Environmental Health

Alternative 8 produces net adverse impacts under the environmental category including geology, water and environmental health, but these are partially mitigated. Significant impacts, benefits and potential mitigation requirements include the following:

- **Beneficial Impact – Sediment Cleanup:** Alternative 8 produces a beneficial impact through remediation and compliance with site cleanup levels consistent with MTCA and SMS requirements. Active cleanup is performed in all of the site areas, including dredging and capping. Monitored natural recovery and institutional controls are used in a very limited manner under this Alternative.

- **Mitigated Impacts – Construction Water Quality:** Alternative 8 involves the most in-water construction activities of all of the project alternatives. The project will require extensive dredging within Bellingham Bay to occur over at least five and as many as seven construction seasons. As with Alternatives 2, 3 and 7, Alternative 8 will also trigger the need for additional shoreline infrastructure improvements in the Inner Whatcom Waterway. These construction activities will need to be mitigated to minimize adverse water quality impacts. Examples of potential mitigation actions include 1) completion of additional water quality review as part of project design and permitting (i.e., Section 401 Water Quality Certification), 2) use of best practices for design, permitting, contracting and construction of dredging activities to minimize water quality impacts and dredge residuals, 3) water quality monitoring during construction, and 4) coordination of cleanup and shoreline infrastructure projects to minimize water quality disturbances.

- **Beneficial Impacts – Controlling Sediment Resuspension:** Alternative 8 conducts active remediation by capping in the impacted harbor areas and in the Whatcom Waterway channel. These actions reduce the potential for future sediment resuspension.

- **Adverse Impact – Shoreline Destabilization:** Alternative 8 includes deep dredging in the Inner Whatcom Waterway in order to comply with the dimensions of the 1960s industrial channel. This deep dredging will tend to further destabilize existing shorelines in this area. To avoid shoreline stability failures, the shoreline will need to be stabilized with new infrastructure compatible with the deep dredging patterns. Mitigation will be required, including the construction of hardened shoreline treatments including bulkheads and over-water wharves. The potential costs to construct this type of shoreline infrastructure have been estimated at $20 to $40 million for the Inner Whatcom Waterway. These costs are not included in the remediation cost estimates of Alternative 8.

- **Beneficial Impact – Log Pond Shoreline Stabilization:** Limited erosion has been noted in some shoreline edges of the Log Pond

cap. Under Alternative 8, these erosional areas would be corrected, resulting in improved long-term performance of the Log Pond cap, and prevention of erosion and/or recontamination.

- **Beneficial Impact – Berm Material Reuse:** Alternative 8 provides for reuse of clean sand and stone materials from the ASB berm. These materials can be used during site cleanup, habitat enhancement and area redevelopment activities. Material reuse conserves environmental resources, and avoids the need for quarrying of new materials from off-site locations. This provides a net environmental benefit relative to project Alternative 1-4 and the No Action Alternative.

Fish and Wildlife

Alternative 8 includes net adverse impacts to fish and wildlife. Benefits are achieved through restoration of aquatic uses in the ASB, but these benefits are offset by short-term disturbances during project construction, the permanent destruction of emergent nearshore habitat in the Inner Whatcom Waterway and ASB shoulder areas, and the requirements for hardened shoreline infrastructure in the Inner Whatcom Waterway. Significant impacts, benefits and potential mitigation requirements associated with Alternative 8 include the following:

- **Beneficial Impacts – Environmental Protection:** Completion of site remediation provides protection of fish and wildlife from the potential effects of contaminated sediments.

- **Mitigated Impact – Construction Disturbances:** Construction of Alternative 8 includes significant construction-related habitat disturbances. The cleanup-related disturbances will occur in several areas, requiring between five and seven construction seasons. Additional disturbances will result from shoreline infrastructure improvements required under this Alternative. Potential disturbances to fish and wildlife must be mitigated in these areas through the use of best practices for project design, permitting and construction. Examples of best practices include 1) the timing of work activities to avoid migration periods for juvenile salmonids or other sensitive species, 2) the use of construction equipment, dredge methods, cap materials and placement methods that minimize water quality impacts, noise and physical disturbances to aquatic habitats, and 3) completion of additional environmental reviews as part of project design and permitting.

- **Adverse Impact -- Inner Whatcom Waterway Habitat:** Through its aggressive dredging of the 1960s federal channel, Alternative 8 triggers the permanent destruction of emergent

shallow-water habitats at the head and along the sides of the Inner Whatcom Waterway. These impacts are integral to the alternative and cannot be mitigated except by creation of new replacement habitat in alternative site areas. Impact avoidance would require the use of alternative channel dimensions (as in Alternative 4, 5 and 6). In addition to the direct impacts associated with the deep dredging, additional habitat impacts will be incurred during the construction of hardened shoreline infrastructure as necessary to support the use and maintenance of the deep draft waterway uses in the Inner Whatcom Waterway under Alternative 8. Alternative 8 includes less habitat development than the preceding alternatives, meaning that habitat losses in the Inner Whatcom Waterway may not be sufficiently mitigated within the Alternative. Additional habitat mitigation measures are likely to be required to offset habitat impacts.

- **Mitigated Impacts – Log Pond Shoreline Enhancements:** Construction of Alternative 8 will involve some in-water construction activities within the Log Pond to enhance the stability of area shorelines. These actions will involve a change in substrate conditions in limited areas, with placement of pebbles and beach gravels in some areas, and placement of stone groins for material retention in other areas. The actions are expected to result in minimal changes to the area of intertidal habitat. However, potential adverse impacts associated with substrate changes may require mitigation through habitat gains in other areas under the alternative.

- **Adverse Impact -- Alternative ASB Access Channel:** Under Alternative 8, the alignment of the marina and the placement of the marina access channel may require modification to avoid conflicts with navigation traffic associated with the federal channel. The alternative alignment will require a greater disruption to existing shallow-water areas offshore of the ASB, and will reduce the area available for habitat bench development. Additional habitat creation may be required to offset habitat impacts and mitigate for the effects of this change.

- **Beneficial Impact – ASB Habitat Gains:** Like Alternatives 5, 6 and 7, Alternative 8 provides for sludge cleanout of the ASB, including opening of the remediated facility for future aquatic uses. This enables development of nearly 4,500 linear feet of new nearshore migration corridors for juvenile salmonids, and development of over 28 acres of new open water habitat.

- **Adverse Impacts – Areas Offshore of ASB and Areas Adjacent to BST:** Under Alternative 8, sediment removal is conducted in areas offshore of the ASB, including the ASB shoulder area.

Removal will also be conducted in Unit 6 areas near BST. Rather than construction of a cap with the positive features of a habitat bench offshore of the ASB as in other project alternatives, Alternative 8 would adversely impact habitat quality in Unit 5 by deepening significant areas of shallow-water nearshore habitat. Some deepening of nearshore habitat in Unit 6 will also occur, with additional adverse impacts to fish and wildlife. The adverse fish and wildlife impacts in these areas contribute to an overall net adverse impact finding for Alternative 8 with respect to fish and wildlife.

Land Use, Navigation and Public Shoreline Access

The land use benefits and impacts of Alternative 8 are similar to those of Alternative 7, as shown in Table 4-2. As with Alternative 7, Alternative 8 results in a net adverse impact to land use, navigation and shoreline access.

Both Alternatives 7 and 8 conduct dredging of the Inner Whatcom Waterway based on the obsolete 1960s federal channel dimensions. That channel was established for an industrial land use pattern that is inconsistent with current zoning and redevelopment planning. Further, the infrastructure required to fully implement the 1960s industrial channel was never fully developed, resulting in shorelines in most of the Inner Whatcom Waterway area that are incapable of achieving an effective water depth consistent with the 1960s channel dimensions. These shorelines were constructed earlier based on the historical 18-foot waterway depth.

As with Alternatives 2, 3, and 7 the Implementation of Alternative 8 poses a significant source of conflict with current community land use priorities through inconsistency of dredging patterns with land use and navigation priorities, and through requirements for new hardened shoreline infrastructure to stabilize project area shorelines.

Air and Noise

Alternative 8 dramatically increases the quantity of construction activities relative to the other project alternatives. Additional impacts will be associated with the construction of new shoreline infrastructure required in the Inner Whatcom Waterway. Potential impacts to area noise and air quality levels will need to be mitigated to avoid environmental impacts. However, mitigation can be accomplished through the use of best practices for project design, permitting and construction.

As with the other project alternatives, potential mitigation measures for noise impacts include 1) contractual requirements to avoid exceedances of ambient noise level restrictions, 2) contractor use of appropriate equipment including mufflers as required, and 3) use of appropriate work periods if required to comply with noise level restrictions.

Air quality impacts associated with capping activities could be experienced either through emissions from construction equipment, or through dust from temporary stockpiles of capping material prior to placement. These impacts can be mitigated through 1) contractual requirements to avoid impacts to air quality, 2) the use of appropriate equipment meeting applicable air quality control requirements, 3) the use of appropriate construction measures (e.g., wetting or covering of cap material stockpiles to control fugitive dust emissions, or 4) the direct supply of cap material by barges to the capping site. These mitigation measures should be incorporated during project design and permitting.

Cultural Resources

Alternative 8 involves extensive dredging activities, including dredging at the head of the Whatcom Waterway in the area near Citizens Dock. This was an area that was identified during previous archaeological assessment activities as potentially containing undisturbed historical or cultural resources. Potential measures to mitigate impacts to these resources would need to be developed during project design and permitting. This would likely be performed as part of the Section 106 consultations as part of Army Corps of Engineers permitting. This consultation would also cover other site areas, though the potential for presence of undisturbed cultural or historical resource in these other areas is much lower.

Table 4-2. Summary of SEPA Analysis of Environmental Impacts

Alternative Name & Description		No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Design Concept Figure		Figure 4-1	Figure 4-2	Figure 4-3	Figure 4-4	Figure 4-5	Figure 4-6	Figure 4-7	Figure 4-8	Figure 4-9
Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
Est. Time for Design/Construction (yrs)		--	6 to 12 yrs	6 to 9 yrs	5 to 8 yrs	3 to 4 yrs	5 to 6 yrs	5 to 6 yrs	7 to 9 yrs	8 to 13 yrs
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
Description of Project Alternatives (by Site Unit)										
Outer Waterway	Site Unit									
Outer Channel	Units 1A/1B	No Action	Monitored Natural Recovery & Institutional Controls	Dredging with Placement in Cornwall-Area CAD Site	Dredging with Placement in ASB Nearshore Fill	Dredging with Beneficial Reuse or PSDDA Disposal	Dredging with Beneficial Reuse or PSDDA Disposal	Dredging with Beneficial Reuse or PSDDA Disposal	Dredging with Beneficial Reuse or PSDDA Disposal	Dredging with Beneficial Reuse or PSDDA Disposal
Port Terminal Area	Unit 1C	No Action	Monitored Natural Recovery & Institutional Controls	Expanded Dredging[8] with Placement in Cornwall-Area CAD	Expanded Dredging[8] with Placement in ASB Nearshore Fill	Dredging for 30-ft Deep Draft Uses with Subtitle D Disposal, Followed by Capping & Institutional Controls	Dredging for 30-ft Deep Draft Uses with Subtitle D Disposal, Followed by Capping & Institutional Controls	Expanded Dredging[8] with Subtitle D Sediment Disposal	Expanded Dredging[8] with Subtitle D Sediment Disposal	Expanded Dredging[8] with Subtitle D Sediment Disposal
Inner Waterway										
Inner Waterway	Unit 2A, 2C & 3B	No Action	Monitored Natural Recovery & Institutional Controls	Dredging of 1960s Federal Channel with Placement in Cornwall-Area CAD Site, Followed by Capping & Institutional Controls	Dredging of 1960s Federal Channel with Placement in ASB Nearshore Fill, Followed by Capping & Institutional Controls	Dredging for Multi-Purpose Channel with Subtitle D Disposal, Followed by Capping & Institutional Controls	Dredging for Multi-Purpose Channel with Subtitle D Disposal, Followed by Capping & Institutional Controls	Dredging for Multi-Purpose Channel with Subtitle D Disposal, Followed by Capping & Institutional Controls	Dredging of 1960s Federal Channel with Subtitle D Disposal, Followed by Capping & Institutional Controls	Dredging of 1960s Federal Channel with Subtitle D Disposal, Followed by Capping & Institutional Controls
ASB Access Channel	Unit 2B	No Action	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging for 18-ft Access Channel with Subtitle D Disposal	Dredging for 18-ft Access Channel with Subtitle D Disposal	Dredging for 18-ft Access Channel with Subtitle D Disposal	Dredging & Subtitle D Disposal
Emergent Tideflat	Units 3A	No Action	Monitored Natural Recovery & Institutional Controls	Dredging of 1960s Industrial Channel with Disposal in Cornwall-Area CAD Site	Dredging of 1960s Industrial Channel with Disposal in ASB Nearshore Fill	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging of 1960s Federal Channel with Subtitle D Disposal	Dredging of 1960s Federal Channel with Subtitle D Disposal
Log Pond	Unit 4	No Action	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]	Enhancements to Shoreline Cap Edges [6]
Areas Offshore of ASB										
Offshore of ASB	Unit 5A	No Action	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging & Subtitle D Disposal
Shoulder of ASB	Unit 5B	No Action	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Sediment Capping[7] & Institutional Controls	Dredging & Subtitle D Disposal
Waterway Side of ASB	Unit 5C	No Action	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging & Subtitle D Disposal
Areas Near Bellingham Shipping Terminal										
Recovered Harbor Areas	Unit 6A	No Action	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging & Subtitle D Disposal
Barge Dock Area	Unit 6B, 6C	No Action	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Sediment Capping & Insitutional Controls	Dredging & Subtitle D Disposal
Starr Rock Area	Unit 7	No Action	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Monitored Natural Recovery & Institutional Controls	Dredging & Subtitle D Disposal
ASB Sludges	Unit 8	No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal of ASB sludges with Dewatering & Subtitle D Disposal	Removal of ASB sludges with Dewatering & Subtitle D Disposal	Removal of ASB sludges with Dewatering & Subtitle D Disposal	Removal of ASB sludges with Dewatering & Subtitle D Disposal
Sediment Disposal Methods										
ASB Sludges	Unit 8	-- NA[3] --	-- NA[3] --	-- NA[3] --	-- NA[3] --	-- NA[3] --	Removal, Dewatering & Subtitle D Disposal of 412,000 cyd ASB Sludges and Overdredge	Removal, Dewatering & Subtitle D Disposal of 412,000 cyd ASB Sludges and Overdredge	Removal, Dewatering & Subtitle D Disposal of 412,000 cyd ASB Sludges and Overdredge	Removal, Dewatering & Subtitle D Disposal of 412,000 cyd ASB Sludges and Overdredge
Aquatic Sediments	All Other Areas	-- NA[4] --	-- NA[4] --	Containment of 585,000 cyd sediments in Cornwall CAD	Containment of 585,000 cyd sediments in ASB Fill	Dredging & Subtitle D Disposal of 68,000 cyd Sediments	Dredging & Subtitle D Disposal of 76,000 cyd Sediments	Dredging & Subtitle D Disposal of 118,000 cyd Sediments	Dredging & Subtitle D Disposal of 479,000 cyd Sediments	Dredging & Subtitle D Disposal of 1.26 million cyd Sediments
						Beneficial Use or PSDDA Disposal of 113,000 cyd Unit 1A/1B Sediment	Beneficial Use or PSDDA Disposal of 113,000 cyd Unit 1A/1B Sediment	Beneficial Use or PSDDA Disposal of 113,000 cyd Unit 1A/1B Sediment	Beneficial Use or PSDDA Disposal of 113,000 cyd Unit 1A/1B Sediment	Beneficial Use or PSDDA Disposal of 113,000 cyd Unit 1A/1B Sediment

Notes:

1: All remedial alternatives involve the use of institutional controls, containment and monitoring to varying degrees. Refer to Sections 1 through 4 of this table for a specific description of remedial alternatives by Sediment Site Unit.
2: Channel depths will be restricted to depths shallower than current bathymetry under Alternative 1, as no dredging would be conducted either in the Inner Waterway or Outer Waterway areas.
3. Not applicable. Under this alternative, no removal of the ASB sludges will be conducted.
4. Not applicable. Under this alternative, no waterway sediment dredging will be conducted.
5. A Subtitle D Facility is a landfill that is designed and permitted for management of solid waste, and includes a liner, a cap, a monitoring network, and institutional controls and financial assurance provisions under state and federal solid waste regulations.
6. The design concept for stabilizing the shoreline cap edges is illustrated in FS Appendix D. The Log Pond area is subject to institutional controls recorded as part of the Log Pond Interim Remedial Action.
7. The design concept for the cap in the Unit 5B area is illustrated in FS Appendix C.
8. Dredging in this area will be conducted to the base of the contaminated sediments, and requirements for capping of the dredged area are not anticipated.

Table 4-2. Summary of SEPA Analysis of Environmental Impacts

Alternative Name & Description		No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Design Concept Figure		Figure 4-1	Figure 4-2	Figure 4-3	Figure 4-4	Figure 4-5	Figure 4-6	Figure 4-7	Figure 4-8	Figure 4-9
Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
Est. Time for Design/Construction (yrs)		--	6 to 12 yrs	6 to 9 yrs	5 to 8 yrs	3 to 4 yrs	5 to 6 yrs	5 to 6 yrs	7 to 9 yrs	8 to 13 yrs
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
1. Impacts, Benefits & Mitigation -- Geology, Water, Environmental Health										
Summary of Impacts & Benefits Geology, Water & Environmental Health		Net Adverse Impacts	Net Adverse Impacts	Net Adverse Impacts	Net Adverse Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Net Adverse Impacts	Net Adverse Impacts
General Cleanup Issues	Varies by Alternative	Adverse Impact -- Cleanup not performed. Action does not protect aquatic receptors	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements	Benefit -- Cleanup achieves environmental health protection through compliance with MTCA & SMS Requirements
		No change -- No construction disturbances to water quality.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to water quality to be managed through use of best practices for design & construction.
Outer Waterway	Units 1A, 1B & 1C	Adverse Impact -- Area has naturally recovered. But subsurface sediments may be resuspended by prop wash in navigation areas.	Benefit -- Potential for disturbance of subsurface sediments by prop wash in navigation areas addressed by institutional controls & monitoring.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.	Benefit -- Active cleanup of Outer Waterway reduces risk of recontamination.
Inner Waterway										
Inner Waterway	Unit 2A, 2C & 3B	Adverse Impact -- Cleanup not completed. Area does not comply with SMS cleanup levels. Prop wash may resuspend subsurface sediments in navigation areas.	Benefit -- Potential for disturbance of subsurface sediments by prop wash in navigation areas addressed by institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.	Benefit -- Active cleanup in Inner Waterway minimizes risk of recontamination. Residual sediments addressed through capping, institutional controls & monitoring.
		Adverse Impact -- Shoreline not stabilized. Lack of completed cleanup will hamper future shoreline stabilization actions.	Adverse Impact -- Shoreline not stabilized. Presence of residual contamination will hamper future shoreline stabilization actions.	Adverse Impact -- Deep dredging of Inner Waterway further destabilizes shorelines. Hardened shoreline infrastructure will be required to mitigate instability and support dredging, use and maintenance of target depths. Intrastructure construction costs estimated $20-40 million.	Adverse Impact -- Deep dredging of Inner Waterway further destabilizes shorelines. Hardened shoreline infrastructure will be required to mitigate instability and support dredging, use and maintenance of target depths. Intrastructure construction costs estimated $20-40 million.	Benefit -- Cleanup stabilizes project shorelines in a manner consistent with planned multi-purpose channel, without requiring extensive new infrastructure.	Benefit -- Cleanup stabilizes project shorelines in a manner consistent with planned multi-purpose channel, without requiring extensive new infrastructure.	Benefit -- Cleanup stabilizes project shorelines in a manner consistent with planned multi-purpose channel, without requiring extensive new infrastructure.	Adverse Impact -- Deep dredging of Inner Waterway further destabilizes shorelines. Hardened shoreline infrastructure will be required to mitigate instability and support dredging, use and maintenance of target depths. Intrastructure construction costs estimated $20-40 million.	Adverse Impact -- Deep dredging of Inner Waterway further destabilizes shorelines. Hardened shoreline infrastructure will be required to mitigate instability and support dredging, use and maintenance of target depths. Intrastructure construction costs estimated $20-40 million.
ASB Access Channel	Unit 2B	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Emergent Tideflat	Units 3A	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Log Pond	Unit 4	Adverse Impact -- Erosion may continue to occur, resulting in recontamination of cap.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.	Benefit -- Shoreline stabilized and potential for recontamination reduced.
Areas Offshore of ASB										
Shoulder of ASB	Unit 5B	Adverse Impact -- Sediment not remediated. Area does not comply with SMS cleanup levels.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.
Other Unit 5 Areas	Units 5A & 5C	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Areas Near Bellingham Shipping Terminal										
Barge Dock Area	Unit 6B, 6C	Adverse Impact -- Sediment not remediated. Area does not comply with SMS cleanup levels.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.	Benefit -- Cleanup action addresses contaminated sediments and prevents recontamination.
Other Unit 6 Areas	Unit 6A	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Starr Rock	Unit 7	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ASB	Unit 8	Adverse Impact -- ASB sludges not remediated.	Benefit -- ASB Sludges are Capped.	Benefit -- ASB Sludges are Capped.	Benefit -- ASB sludges are remediated through nearshore fill creation.	Benefit -- ASB Sludges are Capped.	Benefit -- ASB sludges are remediated.	Benefit -- ASB sludges are remediated.	Benefit -- ASB sludges are remediated.	Benefit -- ASB sludges are remediated.
					Mitigated Impact -- ASB fill will have settlement, vapor control and groundwater quality concerns which are to be mitigated through institutional controls.		Benefit -- ASB remediation permits reuse of clean berm sands for cleanup and/or habitat enhancement activities.	Benefit -- ASB remediation permits reuse of clean berm sands for cleanup and/or habitat enhancement activities.	Benefit -- ASB remediation permits reuse of clean berm sands for cleanup and/or habitat enhancement activities.	Benefit -- ASB remediation permits reuse of clean berm sands for cleanup and/or habitat enhancement activities.

Table 4-2. Summary of SEPA Analysis of Environmental Impacts

Alternative Name & Description		No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Design Concept Figure		Figure 4-1	Figure 4-2	Figure 4-3	Figure 4-4	Figure 4-5	Figure 4-6	Figure 4-7	Figure 4-8	Figure 4-9
Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
Est. Time for Design/Construction (yrs)		--	6 to 12 yrs	6 to 9 yrs	5 to 8 yrs	3 to 4 yrs	5 to 6 yrs	5 to 6 yrs	7 to 9 yrs	8 to 13 yrs
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
2. Impacts, Benefits & Mitigation -- Fish & Wildlife										
Summary of Impacts & Benefits Fish & Wildlife		Net Adverse Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Net Adverse Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Mitigated Impacts	Net Adverse Impacts
General Cleanup Issues	Varies by Alternative	Impact -- Cleanup not performed. Action does not protect aquatic receptors	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.	Benefit -- Completion of cleanup action protects aquatic receptors.
		No change -- No construction disturbances to aquatic organisms.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.	Mitigated Impact -- Construction disturbances managed through use of best practices, appropriate work timing.
Outer Waterway	Units 1A, 1B & 1C	No Change	No Change	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas	No Change -- Dredging Occurs in Deep-Water Areas
Inner Waterway										
Inner Waterway	Unit 2A, 2C & 3B	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Absence of Deep Dredging Retains Shallow-Water Habitat in Nearshore Shoaled Areas	Mitigated Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat and Requires Use of Hardened Shorelines and Bulkheads to Achieve Target Dredge Depths. Impact mitigated by habitat creation at Cornwall CAD.	Adverse Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat and Requires Use of Hardened Shorelines and Bulkheads to Achieve Target Dredge Depths. Impact to require mitigation.	Benefit -- Use of Sloping Shoreline Stabilization Methods Consistent with Multi-Purpose Channel Dimensions Preserves and Enhances Shallow-Water Habitat Along Salmonid Migration Corridors	Benefit -- Use of Sloping Shoreline Stabilization Methods Consistent with Multi-Purpose Channel Dimensions Preserves and Enhances Shallow-Water Habitat Along Salmonid Migration Corridors	Benefit -- Use of Sloping Shoreline Stabilization Methods Consistent with Multi-Purpose Channel Dimensions Preserves and Enhances Shallow-Water Habitat Along Salmonid Migration Corridors	Mitigated Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat and Requires Use of Hardened Shorelines and Bulkheads to Achieve Target Dredge Depths. Impact mitigated through habitat restoration in other areas.	Adverse Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat and Requires Use of Hardened Shorelines and Bulkheads to Achieve Target Dredge Depths. Impact to require mitigation.
ASB Access Channel	Unit 2B	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Emergent Shallow-Water Habitat is Preserved	Mitigated Impact -- Dredging of Channel Converts 0.7 Acres of Shallow-Water Habitat to Deep-Water Bottom Areas. Mitigated by habitat creation in other areas.	Mitigated Impact -- Dredging of Channel Converts 0.7 Acres of Shallow-Water Habitat to Deep-Water Bottom Areas. Mitigated by habitat creation in other areas.	Mitigated Impact -- Dredging of Channel Converts 0.7 Acres of Shallow-Water Habitat to Deep-Water Bottom Areas. Mitigated by habitat creation in other areas.	Adverse Impact -- Dredging of Channel Converts 0.7 Acres of Shallow-Water Habitat to Deep-Water Bottom Areas. Impact not fully mitigated by habitat creation in other areas.
Emergent Tideflat	Units 3A	Benefit -- Emergent Shallow-Water Habitat is Preserved	Benefit -- Emergent Shallow-Water Habitat is Preserved	Mitigated Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat. Impact mitigated by habitat creation at Cornwall CAD.	Adverse Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat. Impact to require mitigation.	Benefit -- Multi-Purpose Channel Preserves Emergent Shallow-Water Habitat	Benefit -- Multi-Purpose Channel Preserves Emergent Shallow-Water Habitat	Benefit -- Multi-Purpose Channel Preserves Emergent Shallow-Water Habitat	Mitigated Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat. Mitigated by habitat creation in other areas.	Adverse Impact -- Dredging of 1960s Industrial Channel Removes Emergent Shallow-Water Habitat. Not fully mitigated by habitat creation other areas.
Log Pond	Unit 4	No Change	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.	Mitigated Impact -- Substrate Modifications and Elevation Changes Required to Stabilize Shoreline Edges of Log Pond. Impacts mitigated through design & permitting.
Areas Offshore of ASB										
Shoulder of ASB	Unit 5B	No Change	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Benefit -- Capping Design Concept Creates 4 to 6 Acres of Premium Nearshore Habitat	Adverse Imapct -- Dredging Converts 4 to 6 Acres of Shallow-Water Area to Deep-Water Area
Other Unit 5 Areas	Units 5A & 5C	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Adverse Imapct -- Dredging Results in Deepening of Existing Shallow-Water Habitat Areas Along ASB Berm
Areas Near Bellingham Shipping Terminal										
Barge Dock Area	Unit 6B, 6C	No Change	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Capping Limited to Deep-Water Areas	No Change -- Dredging Limited to Deep-Water Areas
Other Unit 6 Areas	Unit 6A	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Adverse Impact -- Dredging deepens Shallow-Water Nearshore Habitat Areas. Impacts to require mitigation.
Starr Rock	Unit 7	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change -- Dredging Limited to Deep-Water Areas
ASB	Unit 8	No Change -- ASB remains under non-aquatic use.	No Change -- ASB Sludges are Capped and Area Remains Isolated from Bellingham Bay	No Change -- ASB Sludges are Capped and Area Remains Isolated from Bellingham Bay	No Change -- Nearshore Fill is Constructed within ASB, Converting Area Permanently to Upland Characteristics	No Change -- ASB Sludges are Capped and Area Remains Isolated from Bellingham Bay	Benefit -- ASB is Sludges are Removed and Berm is Opened, Restoring Connection of ASB Basin with Bellingham Bay, restoring 28 acres of open-water habitat and nearly 4,500 linear feet of nearshore habitat along salmonid migration corridor. ASB restoration mitigates for impacts in other areas.	Benefit -- ASB is Sludges are Removed and Berm is Opened, Restoring Connection of ASB Basin with Bellingham Bay, restoring 28 acres of open-water habitat and nearly 4,500 linear feet of nearshore habitat along salmonid migration corridor. ASB restoration mitigates for impacts in other areas.	Benefit -- ASB is Sludges are Removed and Berm is Opened, Restoring Connection of ASB Basin with Bellingham Bay, restoring 28 acres of open-water habitat and nearly 4,500 linear feet of nearshore habitat along salmonid migration corridor. ASB restoration mitigates for impacts in other areas.	Benefit -- ASB is Sludges are Removed and Berm is Opened, Restoring Connection of ASB Basin with Bellingham Bay, restoring 28 acres of open-water habitat and nearly 4,500 linear feet of nearshore habitat along salmonid migration corridor. ASB restoration partially mitigates for impacts in other areas.

Table 4-2. Summary of SEPA Analysis of Environmental Impacts

Alternative Name & Description		No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Design Concept Figure		Figure 4-1	Figure 4-2	Figure 4-3	Figure 4-4	Figure 4-5	Figure 4-6	Figure 4-7	Figure 4-8	Figure 4-9
Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
Est. Time for Design/Construction (yrs)		--	6 to 12 yrs	6 to 9 yrs	5 to 8 yrs	3 to 4 yrs	5 to 6 yrs	5 to 6 yrs	7 to 9 yrs	8 to 13 yrs
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
Cornwall CAD Location	Cornwall Ave Landfill Area	No Change	No Change	Benefit -- Signficiant area of premium nearshore habitat created as part of CAD site development, mitigating for habitat impacts in other site areas.	No Change	No Change	No Change	No Change	No Change	No Change

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Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
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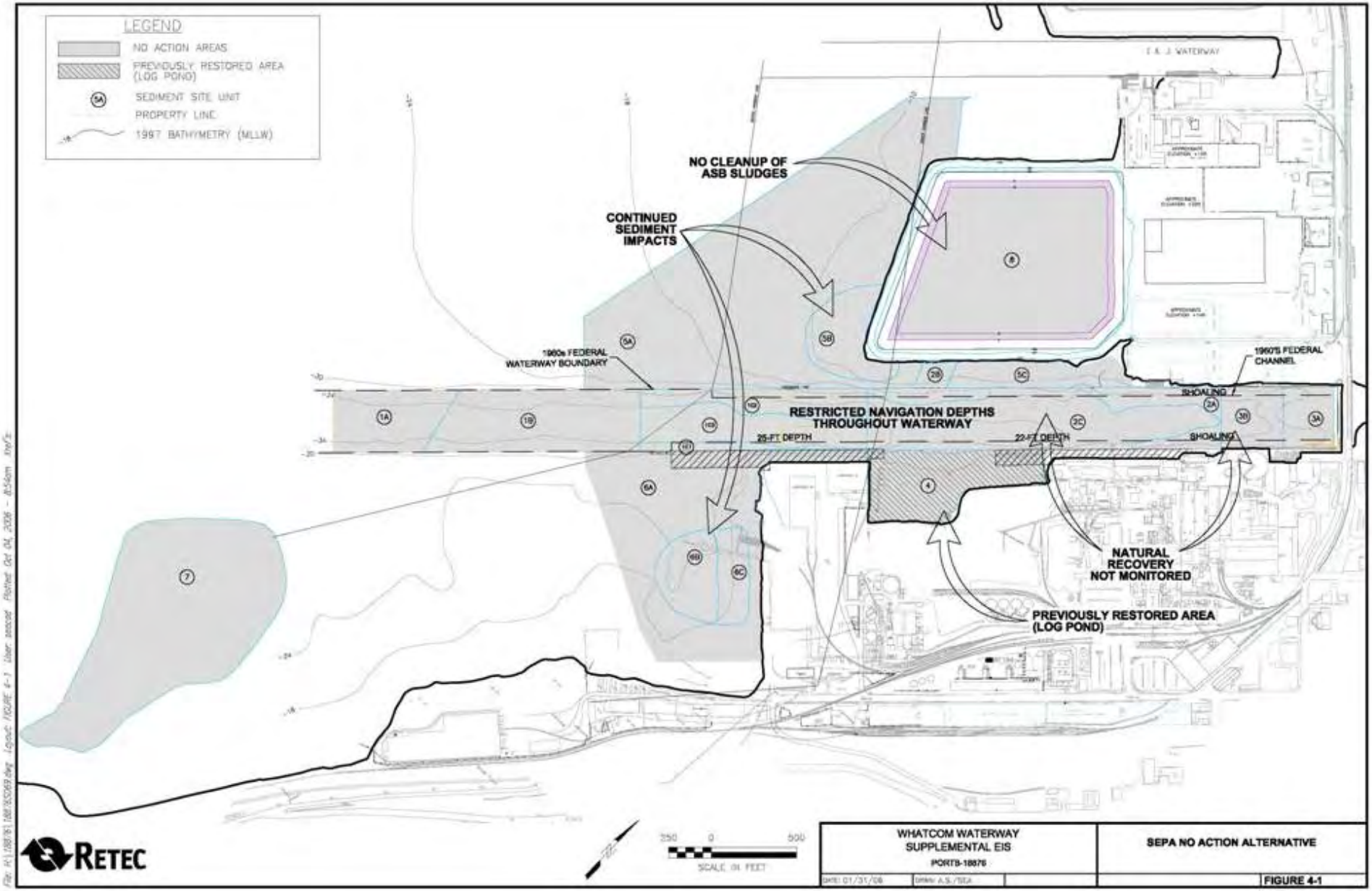
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
3. Impacts, Benefits & Mitigation -- Land Use, Navigation & Public Shoreline Access										
Summary of Impacts & Benefits Land Use, Navigation & Public Access		Net Adverse Impacts	Net Adverse Impacts	Net Adverse Impacts	Net Adverse Impacts	Net Adverse Impacts	Net Beneficial Impacts	Net Beneficial Impacts	Net Adverse Impacts	Net Adverse Impacts
Outer Waterway	Units 1A, 1B & 1C	Adverse Impact -- Restricted Water Depths will Limit Future Deep-Draft Uses of Terminal Area, Conflicting with Current and Planned Uses	Adverse Impact -- Restricted Water Depths will Limit Future Deep-Draft Uses of Terminal Area, Conflicting with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses	Benefit -- Dredging in Outer Waterway Preserves Deep Draft Uses of Terminal Area, Consistent with Current and Planned Uses
Inner Waterway										
Inner Waterway	Unit 2A, 2C & 3B	Adverse Impact -- Restricted Water Depths and Lack of Stabilized Shorelines will Hamper Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment	Adverse Impact -- Restricted Water Depths and Lack of Stabilized Shorelines will Hamper Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment	Adverse Impact -- Industrial Shoreline Infrastructure Requirements and Land Use Restrictions Associated with Federal Channel Conflict with Planned Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment	Adverse Impact -- Industrial Shoreline Infrastructure Requirements and Land Use Restrictions Associated with Federal Channel Conflict with Planned Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment	Benefit -- Cleanup & Shoreline Stabilization Conducted Consistent with Locally-Managed Multi-Purpose Waterway and Planned Mixed-Use Redevelopment, Including Infrastructure and Navigation Planning	Benefit -- Cleanup & Shoreline Stabilization Conducted Consistent with Locally-Managed Multi-Purpose Waterway and Planned Mixed-Use Redevelopment, Including Infrastructure and Navigation Planning	Benefit -- Cleanup & Shoreline Stabilization Conducted Consistent with Locally-Managed Multi-Purpose Waterway and Planned Mixed-Use Redevelopment, Including Infrastructure and Navigation Planning	Adverse Impact -- Industrial Shoreline Infrastructure Requirements and Land Use Restrictions Associated with Federal Channel Conflict with Planned Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment	Adverse Impact -- Industrial Shoreline Infrastructure Requirements and Land Use Restrictions Associated with Federal Channel Conflict with Planned Development of Transient Moorage & Public Access Enhancements as Part of Planned Mixed-Use Redevelopment
ASB Access Channel	Unit 2B	No Change	No Change	No Change	No Change	No Change	Benefit -- Area Dredged Consistent with Plans for Access Channel for Multi-Purpose ASB Marina	Benefit -- Area Dredged Consistent with Plans for Access Channel for Multi-Purpose ASB Marina	Possible Adverse Impact -- Adherence to 1960s Industrial Channel May Require Use of Alternate Access Channel Location for Planned Marina [9]	Possible Adverse Impact -- Adherence to 1960s Industrial Channel May Require Use of Alternate Access Channel Location for Planned Marina [9]
Emergent Tideflat	Units 3A	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Log Pond	Unit 4	No Change	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.	No Change -- Log Pond Cap & Habitat Enhancements Are Preserved. Some Modifications Required to Stabilize Shoreline Edges of Log Pond.
Areas Offshore of ASB										
Shoulder of ASB	Unit 5B	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Other Unit 5 Areas	Units 5A & 5C	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
Areas Near Bellingham Shipping Terminal										
Barge Dock Area	Unit 6B, 6C	No Change	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Capping Design Not Expected to Impact Planned Navigation Uses.	No Change -- Dredging Has No Impact on Planned Navigation Uses.
Other Unit 6 Areas	Unit 6A	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change -- Dredging Has No Impact on Planned Navigation Uses
Starr Rock	Unit 7	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change -- Dredging Has No Impact on Planned Navigation Uses
ASB Area	Unit 8	Adverse Impact -- Lack of ASB Cleanup Conflicts with Planned Restoration of Aquatic Uses within the ASB, Including Development of Marina with Integrated Public Access and Habitat Enhancements.	Adverse Impact -- ASB Cleanup Conflicts with Planned Restoration of Aquatic Uses within the ASB, Including Development of Marina with Integrated Public Access and Habitat Enhancements.	Adverse Impact -- ASB Cleanup Conflicts with Planned Restoration of Aquatic Uses within the ASB, Including Development of Marina with Integrated Public Access and Habitat Enhancements.	Adverse Impact -- ASB Cleanup Conflicts with Planned Restoration of Aquatic Uses within the ASB, Including Development of Marina with Integrated Public Access and Habitat Enhancements.	Adverse Impact -- ASB Cleanup Conflicts with Planned Restoration of Aquatic Uses within the ASB, Including Development of Marina with Integrated Public Access and Habitat Enhancements.	Benefit -- ASB Sludge Removal and Berm Opening is Consistent with Planned Reuse of ASB as Marina with Integrated Public Access and Habitat Enhancements	Benefit -- ASB Sludge Removal and Berm Opening is Consistent with Planned Reuse of ASB as Marina with Integrated Public Access and Habitat Enhancements	Benefit -- ASB Sludge Removal and Berm Opening is Consistent with Planned Reuse of ASB as Marina with Integrated Public Access and Habitat Enhancements	Benefit -- ASB Sludge Removal and Berm Opening is Consistent with Planned Reuse of ASB as Marina with Integrated Public Access and Habitat Enhancements

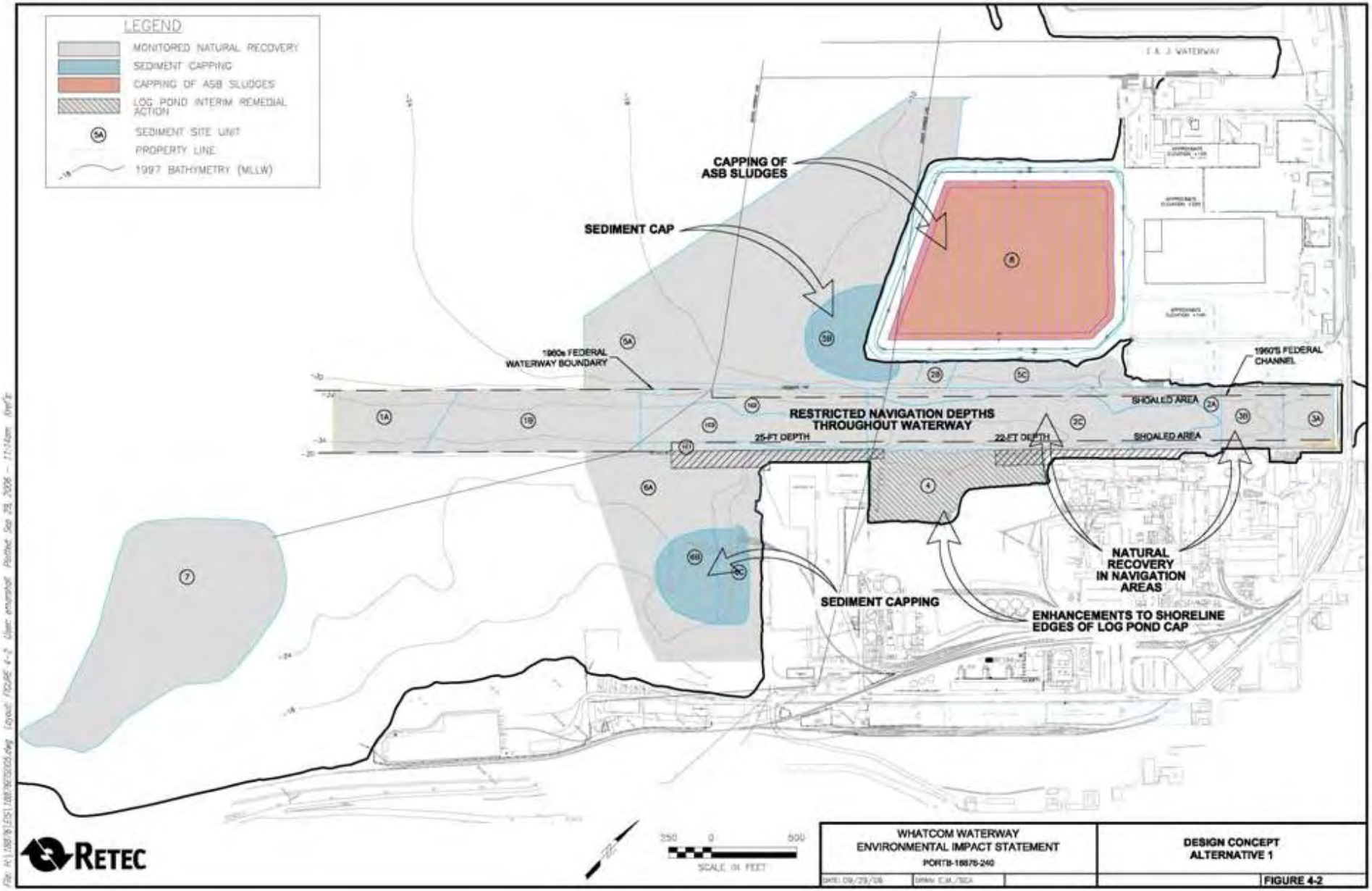
Notes:

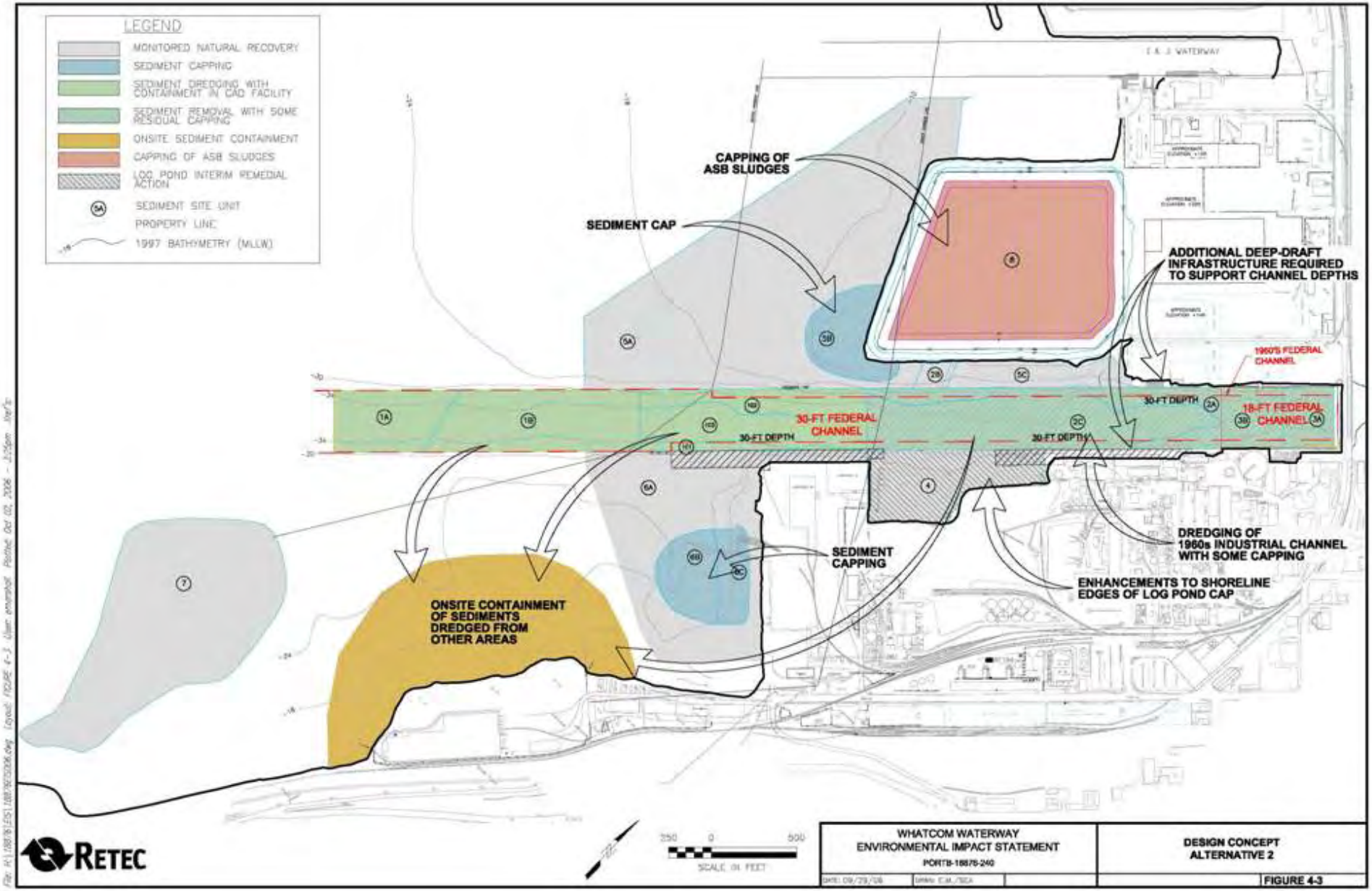
9. Under Alternatives 7 & 8, the marina access channel may have to be relocated to the area offshore of the ASB in order to avoid navigation conflicts between the marina entrance and large-vessel navigation patterns in the Whatcom Waterway.

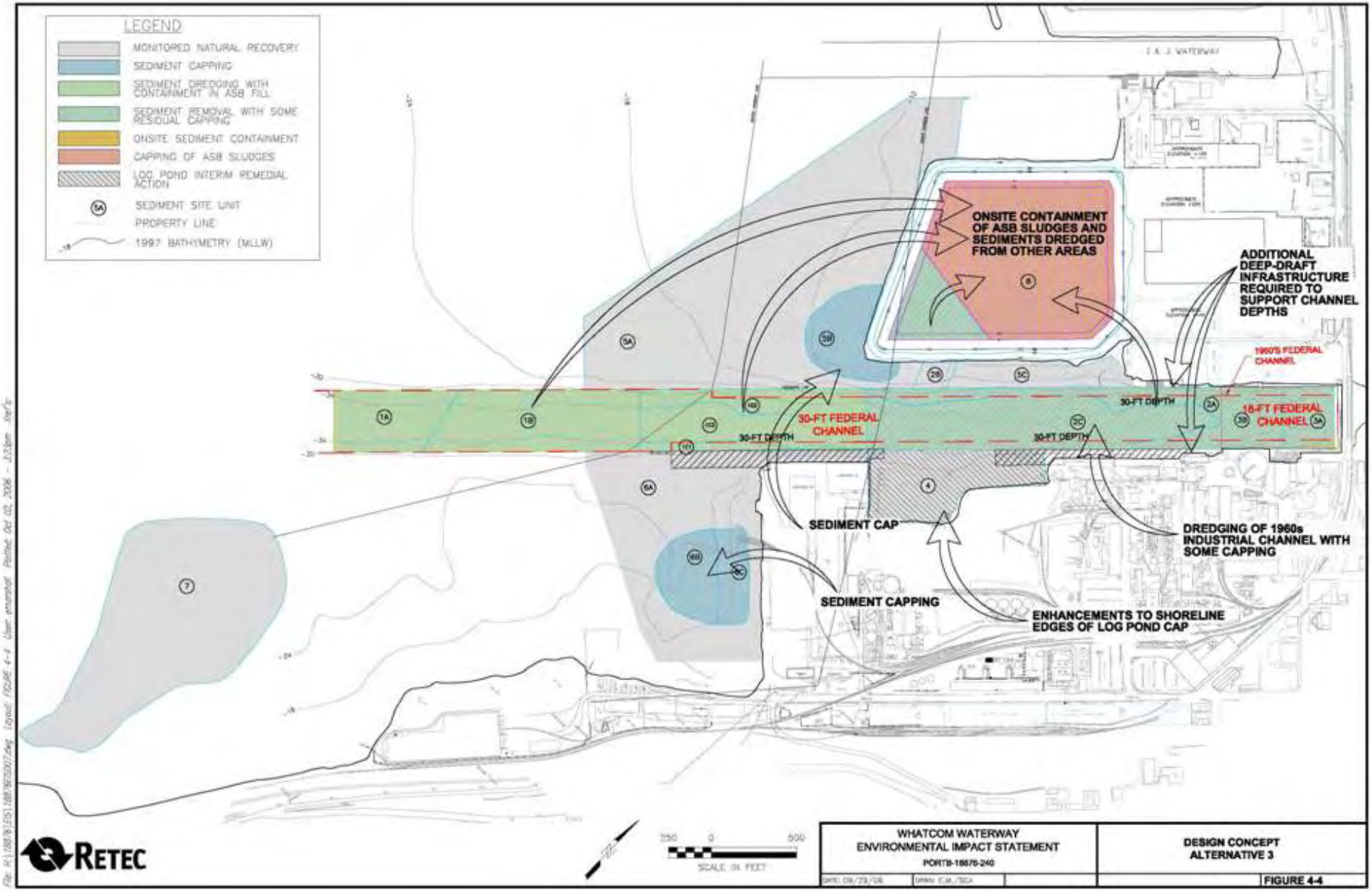
Table 4-2. Summary of SEPA Analysis of Environmental Impacts

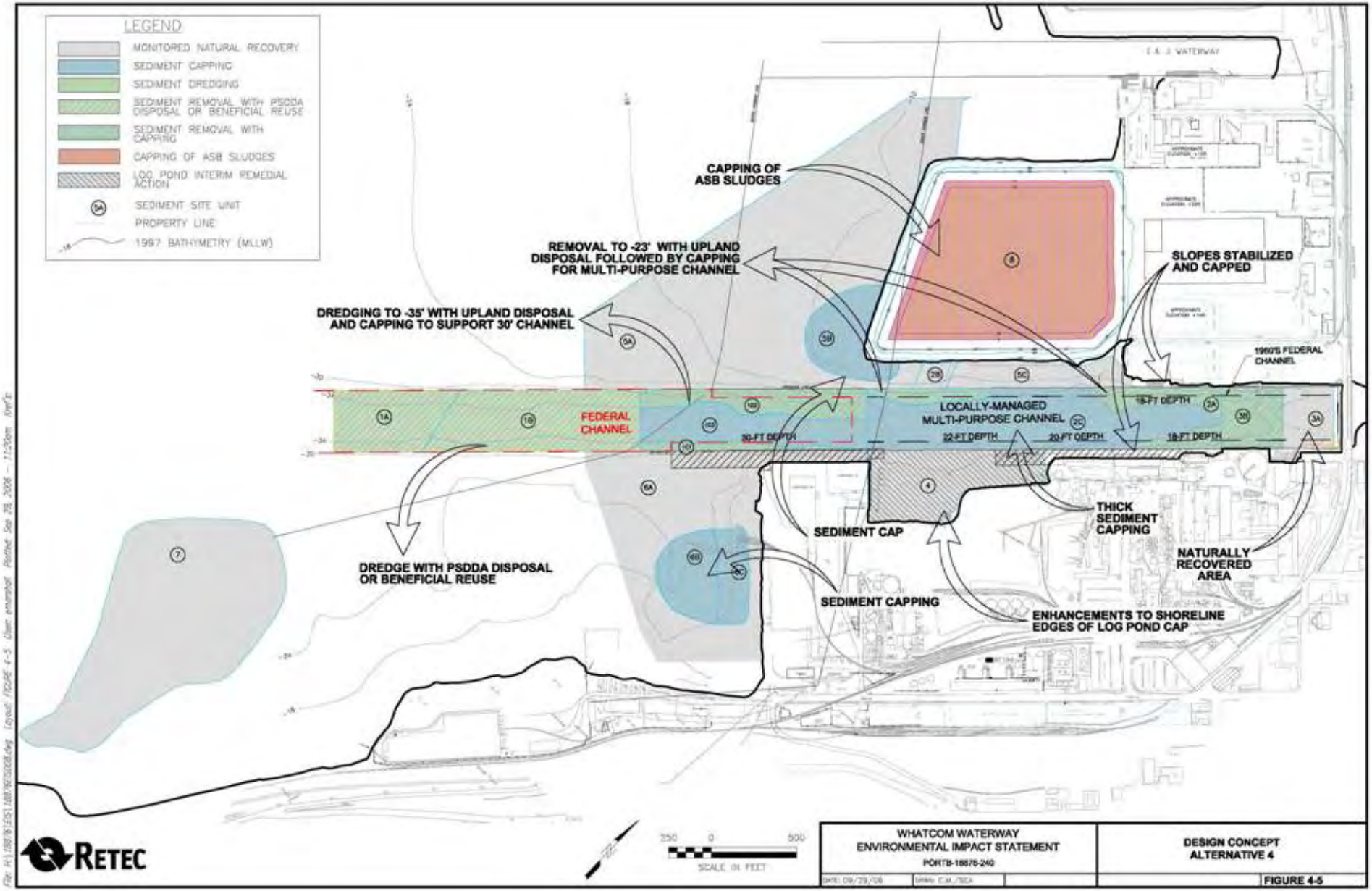
Alternative Name & Description		No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Design Concept Figure		Figure 4-1	Figure 4-2	Figure 4-3	Figure 4-4	Figure 4-5	Figure 4-6	Figure 4-7	Figure 4-8	Figure 4-9
Probable Cost ($ million)		--	$8 million	$34 million	$34 million	$21 million	$42 million	$44 million	$74 million	$146 million
Est. Time for Design/Construction (yrs)		--	6 to 12 yrs	6 to 9 yrs	5 to 8 yrs	3 to 4 yrs	5 to 6 yrs	5 to 6 yrs	7 to 9 yrs	8 to 13 yrs
ASB Area Summary [1]		No Action	Capping of ASB Sludges	Capping of ASB Sludges	Containment of ASB Sludges within Nearshore Fill	Capping of ASB Sludges	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]	Removal, Treatment & Disposal of ASB Sludge in Subtitle D Facility [5]
Waterway Area Summary [1]		No Action	Capping and Monitored Natural Recovery with Restricted Channel Depths [2]	Dredging of 1960s Federal Channel with Disposal at Cornwall CAD	Dredging of 1960s Federal Channel with Disposal in ASB Nearshore Fill	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Expanded Dredging of Multi-Purpose Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel with Upland Disposal in Subtitle D Facility [5]	Dredging of 1960s Federal Channel & Additional Areas with Upland Disposal in Subtitle D Facility [5]
4. Impacts, Benefits & Mitigation -- Air & Noise										
Summary of Impacts & Benefits Air & Noise		-- No Change	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts
General Cleanup Issues	Varies by Alternative	No Change -- No construction disturbances to existing noise levels or air quality.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction disturbances to be managed through use of best practices for design & construction.
5. Impacts, Benefits & Mitigation -- Historical & Cultural Preservation										
Summary of Impacts & Benefits Historical & Cultural Preservation		-- No Change	-- No Change	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts	○ Mitigated Impacts
General Cleanup Issues	Varies by Alternative	No Change -- Alternative does not involve dredging that could potentially disturb historical or archaeological resources.	No Change -- Alternative does not involve dredging that could potentially disturb historical or archaeological resources.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.	Mitigated Impact -- Construction distrubances to be managed through use of best practices for design & construction.
Inner Waterway	Unit 3A	No Change	Benefit -- No dredging in shallow-water areas near former Citizens' Dock, which may have historical or archaeological resources.	Mitigated Impact -- Potential for disturbance of historical or archaeological resources near former Citizens' Dock during dredging to be addressed during design, permitting & construction.	Mitigated Impact -- Potential for disturbance of historical or archaeological resources near former Citizens' Dock during dredging to be addressed during design, permitting & construction.	Benefit -- No dredging in shallow-water areas near former Citizens' Dock, which may have historical or archaeological resources.	Benefit -- No dredging in shallow-water areas near former Citizens' Dock, which may have historical or archaeological resources.	Benefit -- No dredging in shallow-water areas near former Citizens' Dock, which may have historical or archaeological resources.	Mitigated Impact -- Potential for disturbance of historical or archaeological resources near former Citizens' Dock during dredging to be addressed during design, permitting & construction.	Mitigated Impact -- Potential for disturbance of historical or archaeological resources near former Citizens' Dock during dredging to be addressed during design, permitting & construction.
Other Site Areas		No Change	No Change -- Alternative does not involve dredging that could potentially disturb historical or archaeological resources.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.	Mitigated Impact -- Risks of disturbance to historical & archaeological resources lower in other site areas. Risk of disturbance to be mitigated through appropriate project reviews & permitting.

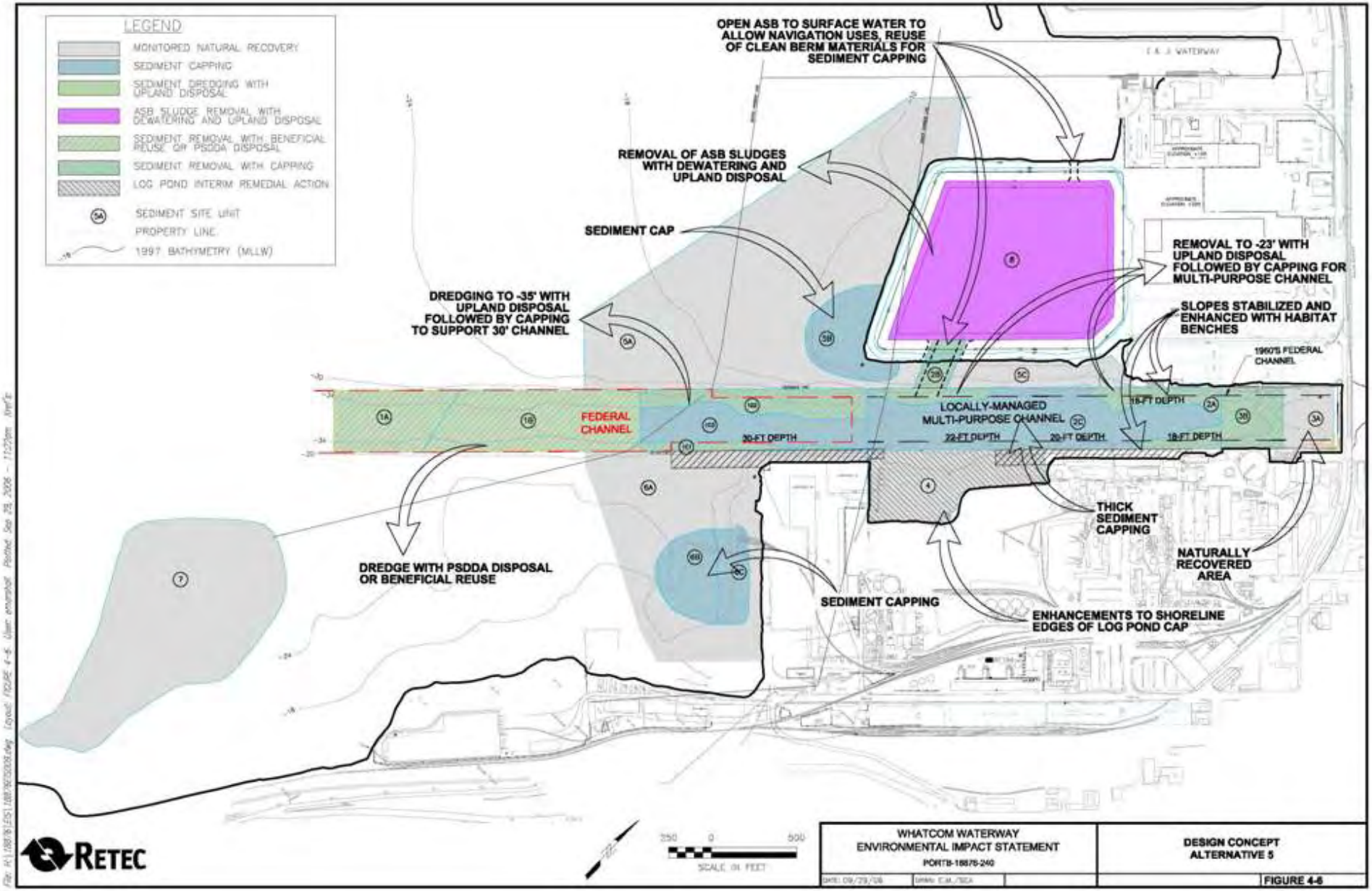

LEGEND
NO ACTION AREAS
PREVIOUSLY RESTORED AREA (LOG POND)
SEDIMENT SITE UNIT
PROPERTY LINE
1987 BATHYMETRY (MLLW)
NO CLEANUP OF ASB SLUDGES
CONTINUED SEDIMENT IMPACTS
1900s FEDERAL WATERWAY BOUNDARY
1960'S FEDERAL CHANNEL
SHOALING
RESTRICTED NAVIGATION DEPTHS THROUGHOUT WATERWAY
25-FT DEPTH
22-FT DEPTH
SHOALING
NATURAL RECOVERY NOT MONITORED
PREVIOUSLY RESTORED AREA (LOG POND)
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY SUPPLEMENTAL EIS
PORTB-18876
SEPA NO ACTION ALTERNATIVE
DATE: 01/31/08
FIGURE 4-1

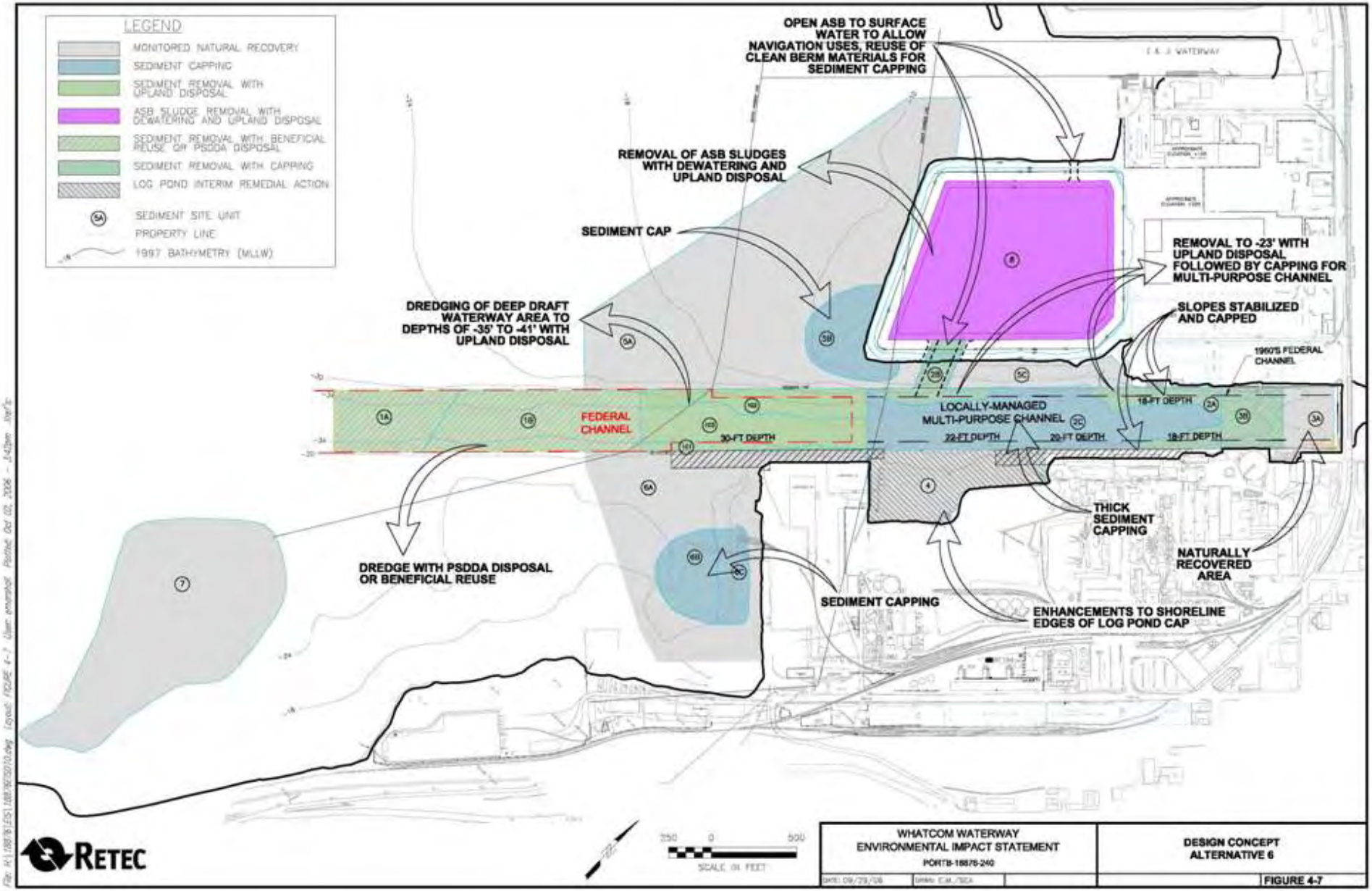

LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
CAPPING OF ASB SLUDGES
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
CAPPING OF ASB SLUDGES
SEDIMENT CAP
1900s FEDERAL WATERWAY BOUNDARY
1960'S FEDERAL CHANNEL
RESTRICTED NAVIGATION DEPTHS THROUGHOUT WATERWAY
25-FT DEPTH
22-FT DEPTH
SHOALED AREA
SHOALED AREA
NATURAL RECOVERY IN NAVIGATION AREAS
SEDIMENT CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT ALTERNATIVE 1
FIGURE 4-2


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING WITH CONTAINMENT IN CAD FACILITY
SEDIMENT REMOVAL WITH SOME RESIDUAL CAPPING
ONSITE SEDIMENT CONTAINMENT
CAPPING OF ASB SLUDGES
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
CAPPING OF ASB SLUDGES
SEDIMENT CAP
ADDITIONAL DEEP-DRAFT INFRASTRUCTURE REQUIRED TO SUPPORT CHANNEL DEPTHS
1960'S FEDERAL CHANNEL
30-FT DEPTH
18-FT FEDERAL CHANNEL
30-FT FEDERAL CHANNEL
30-FT DEPTH
30-FT DEPTH
SEDIMENT CAPPING
DREDGING OF 1960s INDUSTRIAL CHANNEL WITH SOME CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
ONSITE CONTAINMENT OF SEDIMENTS DREDGED FROM OTHER AREAS
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY ENVIRONMENTAL IMPACT STATEMENT
PORTS-18878-240
DESIGN CONCEPT ALTERNATIVE 2
FIGURE 4-3


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING WITH CONTAINMENT IN ASB FILL
SEDIMENT REMOVAL WITH SOME RESIDUAL CAPPING
ONSITE SEDIMENT CONTAINMENT
CAPPING OF ASB SLUDGES
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
ONSITE CONTAINMENT OF ASB SLUDGES AND SEDIMENTS DREDGED FROM OTHER AREAS
ADDITIONAL DEEP-DRAFT INFRASTRUCTURE REQUIRED TO SUPPORT CHANNEL DEPTHS
1960'S FEDERAL CHANNEL
30-FT DEPTH
30-FT FEDERAL CHANNEL
30-FT DEPTH
30-FT DEPTH
18-FT FEDERAL CHANNEL
SEDIMENT CAP
DREDGING OF 1960s INDUSTRIAL CHANNEL WITH SOME CAPPING
SEDIMENT CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY
ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT
ALTERNATIVE 3
FIGURE 4-4


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING
SEDIMENT REMOVAL WITH PSDDA DISPOSAL OR BENEFICIAL REUSE
SEDIMENT REMOVAL WITH CAPPING
CAPPING OF ASB SLUDGES
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
CAPPING OF ASB SLUDGES
REMOVAL TO -23' WITH UPLAND DISPOSAL FOLLOWED BY CAPPING FOR MULTI-PURPOSE CHANNEL
SLOPES STABILIZED AND CAPPED
DREDGING TO -35' WITH UPLAND DISPOSAL AND CAPPING TO SUPPORT 30' CHANNEL
1960'S FEDERAL CHANNEL
FEDERAL CHANNEL
LOCALLY-MANAGED MULTI-PURPOSE CHANNEL
30-FT DEPTH
22-FT DEPTH
20-FT DEPTH
18-FT DEPTH
THICK SEDIMENT CAPPING
SEDIMENT CAP
NATURALLY RECOVERED AREA
DREDGE WITH PSDDA DISPOSAL OR BENEFICIAL REUSE
SEDIMENT CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT ALTERNATIVE 4
FIGURE 4-5


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING WITH UPLAND DISPOSAL
ASB SLUDGE REMOVAL WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT REMOVAL WITH BENEFICIAL REUSE OR PSDDA DISPOSAL
SEDIMENT REMOVAL WITH CAPPING
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
OPEN ASB TO SURFACE WATER TO ALLOW NAVIGATION USES. REUSE OF CLEAN BERM MATERIALS FOR SEDIMENT CAPPING
REMOVAL OF ASB SLUDGES WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT CAP
DREDGING TO -35' WITH UPLAND DISPOSAL FOLLOWED BY CAPPING TO SUPPORT 30' CHANNEL
REMOVAL TO -23' WITH UPLAND DISPOSAL FOLLOWED BY CAPPING FOR MULTI-PURPOSE CHANNEL
SLOPES STABILIZED AND ENHANCED WITH HABITAT BENCHES
1960'S FEDERAL CHANNEL
FEDERAL CHANNEL
LOCALLY-MANAGED MULTI-PURPOSE CHANNEL
30-FT DEPTH
22-FT DEPTH
20-FT DEPTH
18-FT DEPTH
18-FT DEPTH
DREDGE WITH PSDDA DISPOSAL OR BENEFICIAL REUSE
THICK SEDIMENT CAPPING
NATURALLY RECOVERED AREA
SEDIMENT CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT ALTERNATIVE 5
FIGURE 4-6



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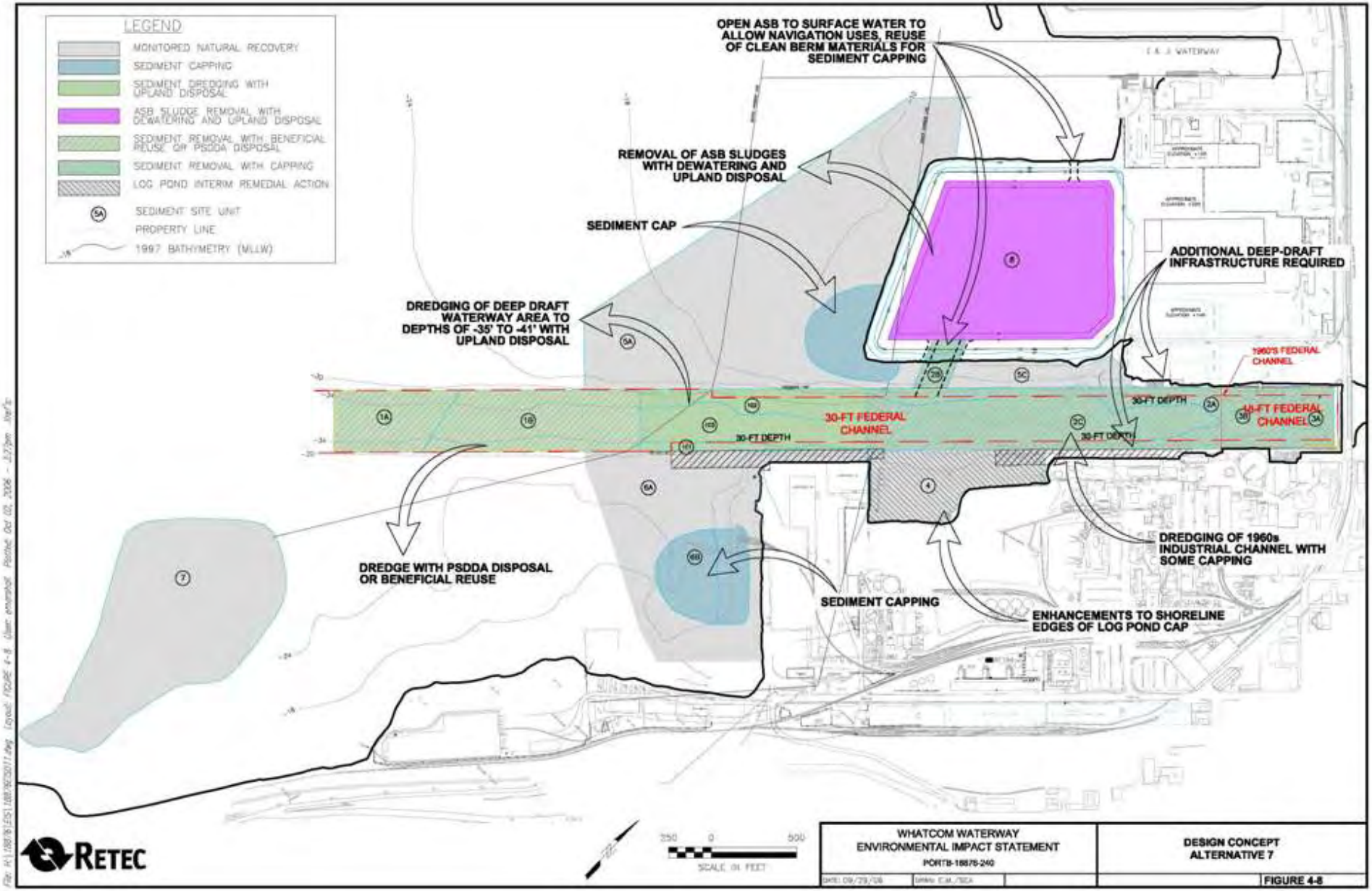
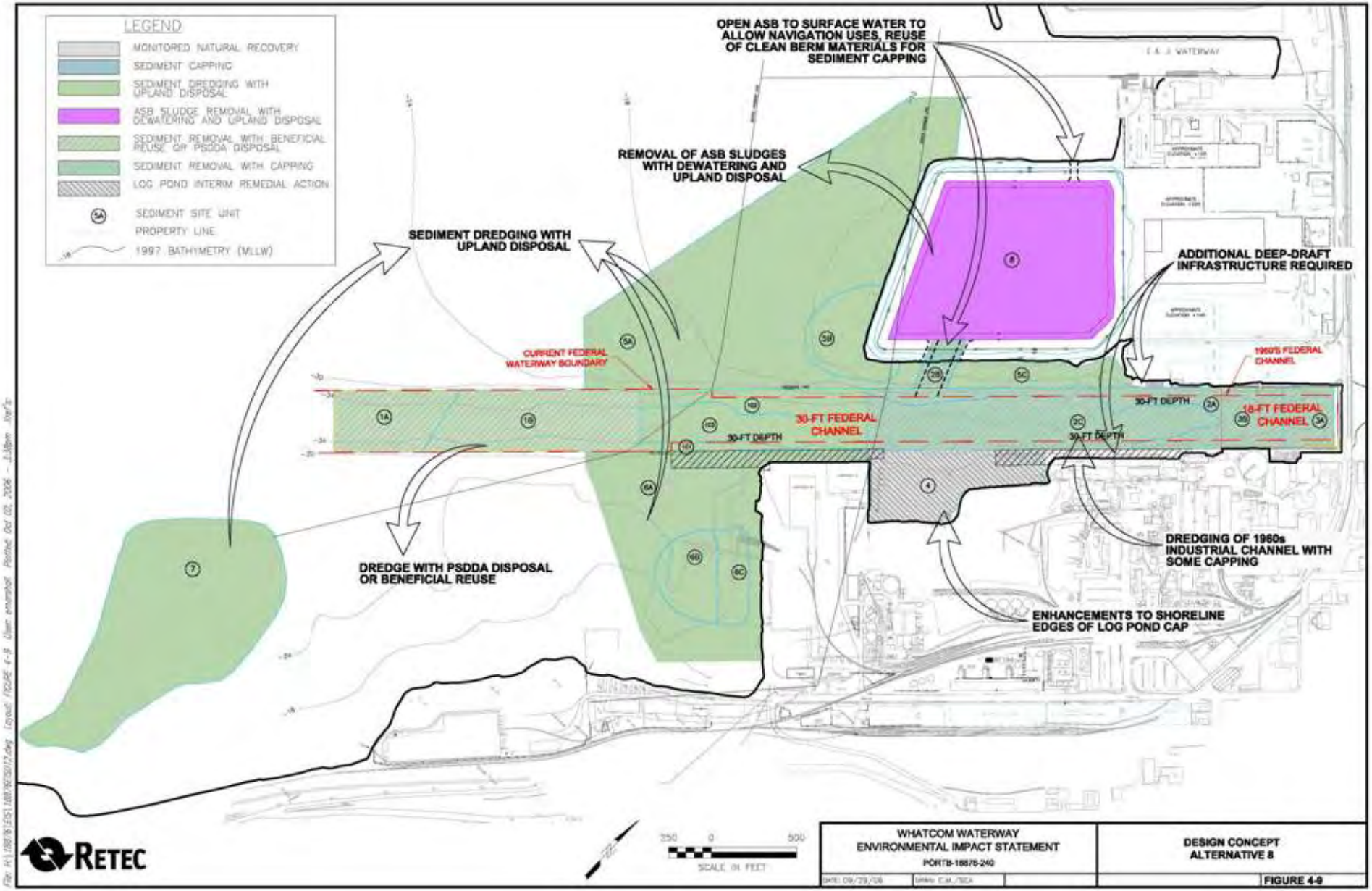
WHATCOM WATERWAY ENVIRONMENTAL IMPACT STATEMENT PORTB-18878-240		DESIGN CONCEPT ALTERNATIVE 6
DATE: 09/29/06	DRWN: E.M./SEA	FIGURE 4-7


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING WITH UPLAND DISPOSAL
ASB SLUDGE REMOVAL WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT REMOVAL WITH BENEFICIAL REUSE OR PSDDA DISPOSAL
SEDIMENT REMOVAL WITH CAPPING
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
OPEN ASB TO SURFACE WATER TO ALLOW NAVIGATION USES. REUSE OF CLEAN BERM MATERIALS FOR SEDIMENT CAPPING
REMOVAL OF ASB SLUDGES WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT CAP
ADDITIONAL DEEP-DRAFT INFRASTRUCTURE REQUIRED
DREDGING OF DEEP DRAFT WATERWAY AREA TO DEPTHS OF -35' TO -41' WITH UPLAND DISPOSAL
1960'S FEDERAL CHANNEL
30-FT DEPTH
30-FT FEDERAL CHANNEL
30-FT DEPTH
30-FT DEPTH
30-FT FEDERAL CHANNEL
DREDGE WITH PSDDA DISPOSAL OR BENEFICIAL REUSE
SEDIMENT CAPPING
DREDGING OF 1960s INDUSTRIAL CHANNEL WITH SOME CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY
ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT
ALTERNATIVE 7
FIGURE 4-8


LEGEND
MONITORED NATURAL RECOVERY
SEDIMENT CAPPING
SEDIMENT DREDGING WITH UPLAND DISPOSAL
ASB SLUDGE REMOVAL WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT REMOVAL WITH BENEFICIAL REUSE OR PSDDA DISPOSAL
SEDIMENT REMOVAL WITH CAPPING
LOG POND INTERIM REMEDIAL ACTION
SEDIMENT SITE UNIT
PROPERTY LINE
1997 BATHYMETRY (MLLW)
OPEN ASB TO SURFACE WATER TO ALLOW NAVIGATION USES, REUSE OF CLEAN BERM MATERIALS FOR SEDIMENT CAPPING
REMOVAL OF ASB SLUDGES WITH DEWATERING AND UPLAND DISPOSAL
SEDIMENT DREDGING WITH UPLAND DISPOSAL
ADDITIONAL DEEP-DRAFT INFRASTRUCTURE REQUIRED
CURRENT FEDERAL WATERWAY BOUNDARY
1960'S FEDERAL CHANNEL
30-FT DEPTH
30-FT FEDERAL CHANNEL
18-FT FEDERAL CHANNEL
DREDGE WITH PSDDA DISPOSAL OR BENEFICIAL REUSE
DREDGING OF 1960s INDUSTRIAL CHANNEL WITH SOME CAPPING
ENHANCEMENTS TO SHORELINE EDGES OF LOG POND CAP
250 0 500
SCALE IN FEET
RETEC
WHATCOM WATERWAY
ENVIRONMENTAL IMPACT STATEMENT
PORTB-18878-240
DESIGN CONCEPT
ALTERNATIVE 8
FIGURE 4-9